

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE <b>J</b>		PAGE OF PAGES <b>1   73</b>	
2. AMENDMENT/MODIFICATION NO. <b>0003</b>		3. EFFECTIVE DATE <b>13-Sep-2002</b>		4. REQUISITION/PURCHASE REQ. NO. <b>W16ROE-2140-0865</b>		5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, NEW YORK ATTN: CENAN-CT ROOM 1843 26 FEDERAL PLAZA (DACA51) NEW YORK NY 10278-0090		CODE <b>DACA51</b>		7. ADMINISTERED BY (If other than item 6)  <b>See Item 6</b>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. <b>DACA51-02-B-0015</b>			
				<input checked="" type="checkbox"/> 9B. DATED (SEE ITEM 11) <b>01-Aug-2002</b>			
				10A. MOD. OF CONTRACT/ORDER NO.			
				10B. DATED (SEE ITEM 13)			
CODE		FACILITY CODE					
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>							
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. <b>FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.</b> If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
<b>13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.</b>							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) The purpose of this amendment is to make changes to the Halon, HVAC and Roof Replacement for Spellman Hall, USMA, West Point, New York. As result of these changes a REVISED BID SCHEDULE is attached:  The bid opening date remains the same on 19 September 2002 at 2:00 P.M. in Room 1841.  Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) by completing items 8 and 15 and returning 1 copy of the amendment (b) by acknowledging receipt of the amendment on each copy of the offer submitted or (c) by separate letter or telegram which includes a references to the solicitation and amendment numbers. <b>FAILURE TO ACKNOWLEDGE AMENDMENTS BY THE DATE AND TIME SPECIFIED MAY RESULT IN REJECTION OF YOUR BID IN ACCORDANCE WITH THE LATE BID, LATE MODIFICATION OF BIDS OR LATER WITHDRAWAL OF BIDS (far 14.304).</b>							
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				TEL: _____ EMAIL: _____			
15B. CONTRACTOR/OFFEROR  _____ (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED  <b>13-Sep-2002</b>	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

AMD #3

The following need to be incorporated into the amendment:

**1. Replace existing Bid Schedule with new attached Bid Schedule Section 00010**

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Lump Sum		
	Sum firm price for supply all labor materials, equipment and any other services necessary to complete the Renovation of the Spellman Halll and DAAS Computer Center as shown on the contract drawings and specifications excluding CLINS 002-0005				

NET AMT

**TOTAL BASE CLIN 0001:** \_\_\_\_\_

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1	Lump Sum		
	New Construction (Optional) All work necessary for construction of the generator and all related equipment (i.e. transfer switches, distribution etc.) in accordance with spec section 16263.				

NET AMT

**TOTAL OPTION CLIN 0002:** \_\_\_\_\_

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003	New Construction (Life Safety) All work necessary for construction of the New sprinkler system on floors 1-5 only as shown on drawings FP-105 thru FP-108	1	Lump Sum		

NET AMT

TOTAL CLIN 0003: \_\_\_\_\_

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004	Lighting Protection (Optional)	1	Lump Sum		

NET AMT

TOTAL OPTION CLIN 0004: \_\_\_\_\_

FOB: Destination

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005	HVAC Direct Digital Controls All work associated with HVAC Direct Digital Controls in accordance with Section 15951A	1	Lump Sum		

NET AMT

TOTAL CLIN 0005: \_\_\_\_\_

GRAND TOTAL BASE + OPTION CLINS (0001-0005): \_\_\_\_\_

FOB: Destination

1. The low bidder for the purpose of award will be the conforming responsible bidder offering the lowest Total Bid Amount for Combined Basic and Optional Work.
2. Any bid, which is materially unbalanced, may be rejected. An unbalanced bid is one, which is based on prices significantly less than cost for some work and prices, and significantly overstated for the other work.
3. Bidders are reminded that they must bid on the issued plans and specifications as amended. Any deviations, conditions or attachments made by the bidder himself thereto may render the bid non-responsive and may be cause for its rejection.
4. Bidders are required to bid on all items or their bid will be rejected.
5. The Optional Work will be exercised within 30 calendar days from NTP.
6. The Government has no obligations to exercise the Optional Work under this contract.

**Wage Rates: Replace wage rates with new attached wage rates NY020007 issued 13 September 2002.**

Replace Specification Section 15950 with Section 15951A DIRECT  
DIGITAL CONTROL FOR HVAC.

2. Drawing M-404, Sequence of Operations, Constant Volume Air Handling  
Unit AHU-1

Revise Dust Collector operation to include the following; " Whenever  
the Dust Collector is started and the AHU-1 is in operation, the outside air  
damper shall be opened from its minimum normal open position to maximum open  
position. When the Dust Collector is de-energized, the maximum outside air  
damper position shall revert back to its minimum normal open position, AHU-1  
remains energized. The Dust Collector shall not be energized whenever the  
AHU-1 is off. Provide a (+/- 3 minute adjustable ) time delay in the Dust  
Collector to start whenever AHU-1 is started from Off position. "

**GENERAL DECISION NY020007 09/13/2002 NY7****Date: September 13, 2002 sg****General Decision Number NY020007****Superseded General Decision No. NY010007****State: New York****Construction Type:****BUILDING****HEAVY****HIGHWAY****County(ies):****DUTCHESS SULLIVAN****ORANGE ULSTER****BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartment up to and including 4 stories), HEAVY AND HIGHWAY CONSTRUCTION PROJECTS****Modification Number Publication Date****0 03/01/2002****1 03/08/2002****2 04/05/2002****3 05/03/2002****4 06/07/2002****5 07/12/2002****6 09/13/2002****COUNTY(ies):****DUTCHESS SULLIVAN****ORANGE ULSTER****\* ASBE0040M 07/01/2002****Rates Fringes****SULLIVAN AND ULSTER COUNTIES****INSULATOR/ASBESTOS WORKERS****(includes application of all****insulating materials, protective****coverings, coatings and finishes****to all types of mechanical systems 20.72 11.64**

**HAZARDOUS WASTE HANDLERS***Duties limited to preparation**wetting; stripping; removal;  
scrapping; vacuuming; bagging;  
and disposing of all insulation  
materials whether they contain  
asbestos or not from mechanical  
systems***16.07      4.70****ASBE0091M 07/01/2002****Rates      Fringes****DUTCHESS AND ORANGE COUNTIES****INSULATOR/ASBESTOS WORKER***(Includes application of all  
insulating materials, protective  
coverings, coatings, and finishes  
to all types of mechanical systems)* **30.32      20.09****HAZARDOUS MATERIAL HANDLER***Duties limited to preparation,  
wetting, stripping, removal  
scrapping, vacuuming, bagging  
and disposing of all insulation  
materials; whether they contain  
asbestos or not from mechanical  
systems***20.85      4.75****\* BOIL0005A 09/01/2002****Rates      Fringes****BOILERMAKER      \$35.86      21.17+a****FOOTNOTE:****a. PAID HOLIDAYS:** *New Years Day, Thanksgiving Day, Memorial  
Day, Independence Day, Labor Day and Good Friday, Friday after**Thanksgiving, Christmas Eve Day and New Years Eve***BRNY0029C 06/01/1999****Rates      Fringes****DUTCHESS, ORANGE (Excluding the**

**town of Tuxedo), SULLIVAN, AND  
ULSTER COUNTIES**

**BUILDING CONSTRUCTION**

**Bricklayers, Cement Masons,  
Plasterers, Stone Masons      21.46      11.20**

**HIGHWAY CONSTRUCTION**

**Bricklayers, Cement Masons,  
Plasterers, Stone Masons      21.96      11.20**

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**ORANGE COUNTY (Including the town  
of Tuxedo)**

**BUILDING CONSTRUCTION**

**Bricklayers, Cement Masons,  
Plasterers, Stone Masons      25.38      12.80**

**HEAVY & HIGHWAY CONSTRUCTION**

**Bricklayers, Cement Masons,  
Plasterers, Stone Masons      25.88      12.80**

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**CARP0019A 06/01/2001**

**Rates      Fringes**

**BUILDING CONSTRUCTION**

**Carpenters, Millwrights,  
Pile Drivers      24.80      11.335**

**HEAVY & HIGHWAY CONSTRUCTION**

**Carpenters, Millwrights,  
Pile Drivers      24.80      11.335**

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**CARP0740B 01/01/2002**

**Rates      Fringes**

**DUTCHESS AND ORANGE COUNTIES**

**MILLWRIGHTS      35.21      25.96**

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**CARP1456C 07/01/2001**

**Rates      Fringes**

**DUTCHESS AND ORANGE COUNTIES**



<b>DIVERS</b>	<b>41.17</b>	<b>23.64</b>
<b>DIVER TENDERS</b>	<b>30.39</b>	<b>23.64</b>
<b>DOCKBUILDERS</b>	<b>33.48</b>	<b>23.64</b>

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**ELEC0363A 07/01/2002**

**Rates                      Fringes**  
**ORANGE, DUTCHESS (Towns of Fishkill, East Fishkill and Beacon)**

<b>ELECTRICIAN</b>	<b>34.00</b>	<b>17.54</b>
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**DUTCHESS (Remaining Townships), ULSTER AND SULLIVAN COUNTIES**

<b>ELECTRICIAN</b>	<b>30.00</b>	<b>17.30</b>
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**ELEC1249B 05/05/2002**

**Rates                      Fringes**  
**LINE CONSTRUCTION (LINEMAN)**

**LIGHTING AND TRAFFIC SIGNAL  
INCLUDING ANY AND ALL FIBER  
OPTIC CABLE NECESSARY FOR THE  
TRAFFIC SIGNAL SYSTEMS, AND  
TRAFFIC MONITORING SYSTEMS, ROAD  
WEATHER INFORMATION SYSTEMS**

<b>Lineman and Technician</b>	<b>28.39</b>	<b>8.00+6.5%+a</b>
<b>Groundman Digging Machine Operator</b>	<b>25.55</b>	<b>8.00+6.5%+a</b>
<b>Mechanic</b>	<b>22.71</b>	<b>8.00+6.5%+a</b>
<b>Groundman Truck Driver (Tractor Trailer Unit)</b>	<b>24.13</b>	<b>8.00+6.5%+a</b>
<b>Groundman Truck Driver</b>	<b>22.71</b>	<b>8.00+6.5%+a</b>
<b>Flagman</b>	<b>17.03</b>	<b>8.00+6.5%+a</b>

**PAID HOLIDAYS:**

**a. Memorial Day, New Year's Day, President's Day, Good  
Friday, Decoration Day, Independence Day, Labor Day, Thanksgiving  
Day, Christmas Day, and Election Day for the President of the  
United States and Election Day for the Governor of New York  
State, provided the employee works two days before or two days  
after the holiday.**

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**ELEC1249D 05/05/2002**

**Rates                      Fringes**

**LINE CONSTRUCTION:**

**Substation:**

<b>Lineman &amp; Technician</b>	<b>30.01</b>	<b>8.00+7%+a</b>
<b>Cable Splicer</b>	<b>33.01</b>	<b>8.00+7%+a</b>
<b>Groundman digging machine Operator</b>	<b>27.01</b>	<b>8.00+7%+a</b>
<b>Mechanic</b>	<b>24.01</b>	<b>8.00+7%+a</b>
<b>Groundman truck driver</b>		
<b>(tractor trailer unit)</b>	<b>25.51</b>	<b>8.00+7%+a</b>
<b>Ground man truck driver</b>	<b>24.01</b>	<b>8.00+7%+a</b>
<b>Flagman</b>	<b>18.01</b>	<b>8.00+7%+a</b>

**Switching structures; railroad catenary installation and maintenance, third rail type underground fluid or gas filled transmission conduit and cable installations (including any and all fiber optic ground product by any other name manufactured for the dual purpose of ground fault protection and fiber optic capabilities), pipetype cable installation and maintenance jobs or projects, and maintenance bonding of rails; Pipetype cable installation**

<b>Lineman &amp; Technician</b>	<b>31.30</b>	<b>8.00+7%+a</b>
<b>Cable Splicer</b>	<b>34.43</b>	<b>8.00+7%+a</b>
<b>Groundman Digging Machine Operator</b>	<b>28.17</b>	<b>8.00+7%+a</b>
<b>Mechanic</b>	<b>25.04</b>	<b>8.00+7%+a</b>
<b>Groundman Truck Driver (Tractor-trailer unit)</b>	<b>26.61</b>	<b>8.00+7%+a</b>
<b>Groundman Truck Driver</b>	<b>25.04</b>	<b>8.00+7%+a</b>
<b>Flagman</b>	<b>18.78</b>	<b>8.00+7%+a</b>

**Overhead and underground distribution and maintenance work and all overhead and underground transmission line work including any and all fiber optic ground wire, fiber optic shield wire or any other like product by any other name**

*manufactured for the dual purpose of ground fault protection and fiber optic capabilities (where no other trades are or have been involved):*

<i>Lineman and Technician</i>	<i>30.01</i>	<i>8.00+7%+a</i>
<i>Cable Splicer</i>	<i>30.01</i>	<i>8.00+7%+a</i>
<i>Groundman digging machine operator</i>	<i>27.01</i>	<i>8.00+7%+a</i>
<i>Mechanic</i>	<i>24.01</i>	<i>8.00+7%+a</i>
<i>Groundman truck driver (tractor trailer unit)</i>	<i>25.51</i>	<i>8.00+7%+a</i>
<i>Groundman Truck driver</i>	<i>24.01</i>	<i>8.00+7%+a</i>
<i>Flagman</i>	<i>18.01</i>	<i>8.00+7%+a</i>
<i>Overhead transmission line work (where other trades are or have been involved):</i>		
<i>Lineman and Technician</i>	<i>32.51</i>	<i>8.00+7%+a</i>
<i>Cable Splicer</i>	<i>32.51</i>	<i>8.00+7%+a</i>
<i>Groundman digging machine operator</i>	<i>29.26</i>	<i>8.00+7%+a</i>
<i>Mechanic</i>	<i>26.01</i>	<i>8.00+7%+a</i>
<i>Groundman truck driver (tractor trailer unit)</i>	<i>27.63</i>	<i>8.00+7%+a</i>
<i>Groundman truck driver</i>	<i>26.01</i>	<i>8.00+7%+a</i>
<i>Flagman</i>	<i>19.51</i>	<i>8.00+7%+a</i>

**TELEPHONE, CATV FIBEROPTICS  
CABLE AND EQUIPMENT**

<i>Cable splicer/Central Office</i>		
<i>Person</i>	<i>22.29</i>	<i>2.80+3%</i>
<i>Installer Repairman-Teledata</i>		
<i>Lineman/Tecnician-Equipment</i>		
<i>Operator</i>	<i>21.17</i>	<i>2.80+3%</i>
<i>Groundman</i>	<i>11.22</i>	<i>2.80+3%</i>

<b>TREE TRIMMER</b>	<b>16.84</b>	<b>3.85+3%+b</b>
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**FOOTNOTE:**

*a. PAID HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, Good Friday, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, and election Day for the President of the United States and Election Day for the Governor of New York State, provided the employee works two days before or two days after the holiday.*

- b. New Years Day, Washington's Birthday, Good Friday, Decoration Day, Independence Day, Labor Day, Veteran's Thanksgiving Day, Day after Thanksgiving Day and Christmas Day*
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**ELEC1249I 05/05/2002**

**Rates Fringes**  
**SULLIVAN COUNTY**

**LINE CONSTRUCTION**

**LIGHTING AND TRAFFIC SIGNAL  
 LINEMAN INCLUDING ANY AND ALL  
 FIBER OPTIC CABLE NECESSARY FOR  
 THE TRAFFIC SIGNAL SYSTEM, TRAFFIC  
 MONITORING SYSTEMS AND ROAD WEATHER  
 INFORMATION SYSTEMS..**

<b>Lineman &amp; Technician</b>	<b>27.14</b>	<b>8.00+6.5%+a</b>
<b>Groundman Digging Machine Operator</b>	<b>24.43</b>	<b>8.00+6.5%+a</b>
<b>Mechanic</b>	<b>21.71</b>	<b>8.00+6.5%+a</b>
<b>Groundman Truck Driver (tractor trailer unit)</b>	<b>23.07</b>	<b>8.00+6.5%+a</b>
<b>Groundman Truck Driver</b>	<b>21.71</b>	<b>8.00+6.5%+a</b>
<b>Flagman</b>	<b>16.28</b>	<b>8.00+6.5%+a</b>

**FOOTNOTE:**

- a. New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, plus President's Day, Good Friday, Decoration Day, Election Day, for the President of the*

*United States and Election Day for the Governor of the State of New York, provided the employee works the day before or the day after the holiday.*

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**ELEV0138A 05/01/2002**

**Rates Fringes**  
**ELEVATOR CONSTRUCTOR**

<b>MECHANIC</b>	<b>35.945</b>	<b>10.335+a+b</b>
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**FOOTNOTE:**

- a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence*

*Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.*

*b. PAID VACATION: Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 5 years of service, and 6% for employees with less than 5 years of service.*

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*\* ENGI0106D 07/01/2002*

*Rates Fringes*

*NORTHERN PART OF DUTCHESS (To The Northern Boundary line of the City of Poughkeepsie)*

***POWER EQUIPMENT OPERATORS HEAVY AND HIGHWAY***

<b><i>GROUP 1</i></b>	<b><i>27.26</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 2</i></b>	<b><i>26.83</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 3</i></b>	<b><i>25.52</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 4</i></b>	<b><i>23.35</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 5</i></b>	<b><i>28.44</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 6</i></b>	<b><i>27.76</i></b>	<b><i>13.10+a</i></b>
<b><i>GROUP 7</i></b>	<b><i>28.26</i></b>	<b><i>13.10+a</i></b>

***POWER EQUIPMENT OPERATORS HEAVY & HIGHWAY CLASSIFICATIONS***

***GROUP 1:-Boom Truck (over 5 tons), Crane, Cherry Picker (over 5 ton capacity), Derricks (steel erection), Dragline, Overhead Crane (Gantry or Straddle type) Pile Driver, Truck Crane***

***GROUP 2:- Automated Concrete Spreader (CMI Type), Automated Fine Grader, Backhoe (Except Tractor Mounted, Rubber Tired), Backhoe Excavator Full Swing (CAT 212 or similar type), Belt Placer (CMI Type), Blacktop Plant (Automated), Boom truck (5 tons and under), Cableway, Caisson Auger, Central Mix Concrete Plant (Automated), Concrete Curb Machine, Self-Propelled, Slipform, Concrete Pump (8" or over), Dredge, Dual Drum Paver, Excavator (All Purpose-Hydraulically Operated) (Gradall or similar), Front End Loader (4 cu. yd. and over), Head Tower (Sauerman or Equal), Hoist (Two or Three drum), Holland Loader, Mine Hoist, Mucking Machine or Mole, Pavement Breaker (SP) Wertgen; PB-4 and similar type, Power Grader, Profiler (over 105 H.P.), Quad 9, Quarry Master (or equivalent), Scraper, Shovel, Side Boom, Slip Form Paver, Tractor Drawn Belt-type loader, Truck or Trailer Mounted Log Chipper***

***(Self feeder), Tug Operator (Manned Rented Equipment excluded),***

### ***Tunnel Shovel***

***GROUP 3 - Asphalt Paver, Backhoe (Tractor Mounted, Rubber Tired), Bituminous Spreader and Mixer, Blacktop Plant (Non-Automated), Blast or Rotary Drill (Truck or Tractor Mounted), Boring Machine, Cage-Hoist, Central Mix Plant (Non-Automated) and All Concrete Batching Plants, Cherry Picker (5 Tons Capacity and Under), Compressors (4 or less) Exceeding 2000 C.F.M. Combined Capacity, Concrete Paver (over 16S), Concrete Pump (Under 8"), Crusher, Diesel Power Unit, Drill Rigs (Tractor Mounted), Front End Loader (under 4 c.y.), Hi-Pressure - Boiler (15 lbs. and over), Hoist (One Drum) Kolman Plant Loader and Similar Type Loaders, L.C.M. Work Boat Operator, Locomotive, Maintenance Engineer/Greaseman/Welder, Mixer (For Stabilized Base Self-Propelled), Monorail Machine, Plant Engineer, Pug Mill, Pump Crete, Ready Mix Concrete Plant, Refrigeration Equipment (For Soil Stabilization), Road Widener, Roller (All Above Subgrade), Sea Mule, Self-contained Ride-on-Rock Drill, excluding Air Track Type Drill, Skidder, Tractor With Dozer and/or Pusher, Trencher, Tugger-Hoist, Vermeer saw (ride on, any size or type), Winch, Winch Cat.***

***GROUP 4 - A-Frame Winch Hoist on Truck, Ballast Regulator (Ride-On), Compressors (4 not to exceed 2000 C.F.M. Combined Capacity; or 3 or less with more than 1200 C.F.M. but not to exceed 2000 C.F.M.), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (4 of Any Type Of Combination), Concrete Pavement Spreaders and Finishers, Conveyor, Directional Drill Machine Locator, Drill Core, Drill Well, Electric Pump Used In Conjunction with Well Point System, Farm Tractor with Accessories, Fine Grade Machine, Fork Lift (under 15 ft.), Grout Pump Gunite Machine, Hammers (Hydraulic-Self-Propelled), Hydra-Spiker (Ride-On), Hydro-Blaster Water, Post Hole Digger and Post Driver, Power Sweeper, Roller (Grade and Fill), Scarifier (Ride-On Spansaw (Ride-On), Skid Steer loader (Bobcat or similar), Submersible Electric Pump (When Used In Lieu Of Well Point System), Tamper (Ride-On), Tie Extractor (Ride-On), Tie Handler, Tie Inserter (Ride-On), Tie Spacer (Ride-On), Tire Repair, Track Liner, Tractor With Towed Accessories, Vibratory Compactor, Vibro Tamp, Well Point, Aggregate Plant, Boiler (Used In Conjunction With Production), Cement and Bin Operator, Compressors (3 or less not to Exceed 1200 C.F.M. Combined Capacity), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (3 or less of Any Type or Combination), Concrete Paver or Mixer (16S and under), Concrete Saw (Self-Propelled), Fireman, Form Tamper, Hydraulic Pump (Jacking System), Light Plants, Mulching Machine, Oiler, Parapet-Concrete or Pavement Grinder, Power Broom (Towed),***

*Power Heaterman, Revinius Widener, Shell Winder, Steamcleaner, Tractor.*

**GROUP 5 - Master Mechanic**

**GROUP 6 - Crane Premium with Boom Length and Jib 150' - 199'**

**GROUP 7 - Crane Premium with Boom Length and Jib 200' and Over.**

**Tower Crane Premium      \$ .50**

**Hazmat work premium      \$2.50**

**Hydrographic              \$ .50**

**FOOTNOTES:**

*a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, provided the employee works the day before and the day after the holiday.*

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**ENGI0106M 05/01/2002**

**Rates              Fringes**

**NORTHERN PART OF DUTCHESS (TO THE NORTHERN BOUNDARY LINE OF THE CITY OF POUGHKEEPSIE) BUILDING CONSTRUCTION**

**POWER EQUIPMENT OPERATORS:**

<b>GROUP 1:</b>	<b>23.67</b>	<b>12.15+a</b>
<b>GROUP 2:</b>	<b>25.64</b>	<b>12.15+a</b>
<b>GROUP 3:</b>	<b>23.64</b>	<b>12.15+a</b>
<b>GROUP 4:</b>	<b>23.24</b>	<b>12.15+a</b>
<b>GROUP 5:</b>	<b>22.57</b>	<b>12.15+a</b>
<b>GROUP 6:</b>		
<b>1</b>	<b>25.99</b>	<b>12.15+a</b>
<b>2</b>	<b>26.34</b>	<b>12.15+a</b>
<b>3</b>	<b>27.14</b>	<b>12.15+a</b>
<b>4</b>	<b>27.64</b>	<b>12.15+a</b>
<b>5</b>	<b>28.14</b>	<b>12.15+a</b>
<b>GROUP 7</b>		
<b>1</b>	<b>26.14</b>	<b>12.15+a</b>
<b>2</b>	<b>27.14</b>	<b>12.15+a</b>
<b>3</b>	<b>27.64</b>	<b>12.15+a</b>
<b>4</b>	<b>28.14</b>	<b>12.15+a</b>
<b>GROUP 8</b>	<b>23.92</b>	<b>12.15+a</b>
<b>GROUP 9</b>	<b>26.14</b>	<b>12.15+a</b>

**Hazardous work - Anytime Operating Engineers are involved with level C or above, \$2.50 per**

*hour over regular rate.*

**FOOTNOTE:**

*a. Paid Holiday: New Years Day, Memorial Day, Independence Day  
Labor Day, Thanksgiving Day, Christmas Day,*

**POWER EQUIPMENT OPERATOR CLASSIFICATIONS**

**GROUP 1:** *Self-contained crawler drill, hydraulic rock drill.*

**GROUP 2:** *Crane, hydraulic cranes, tower crane, locomotive crane,  
piledriver, cableway, derricks, whirlies, dragline, boom truck  
(over 5 tons)*

**GROUP 3:** *Shovel, All backhoe (except tractor mounted rubber  
tired John Deere 510 or smaller), gradalls, power road grader,  
all CMI equipment, front-end rubber tire loader, tractor-mounted  
drill (quarry master), mucking machine, concrete central mix*

*plant, concrete pump, Belcrete system, automated asphalt concrete  
plant and tractor road paver, boom truck (5 tons and under).*

**GROUP 4:** *Backhoe, (tractor mounted rubber tired equivalent to  
John Deere 510 or less), bulldozer, pushcat, tractor,  
traxcavator, scraper, LeTourneau grader, form fine grader, road  
roller, blacktop roller, blacktop spreader, power brooms,  
sweepers, trenching machine, Barber Green loader, side booms,  
hydrohammer, concrete spreader, concrete finishing machine, one  
drum hoist, power hoisting (single drum), hoist - two drum or  
more, three drum engine, power hoisting (two drum and over), two  
drum and swinging engine, three drum swinging engine, hod hoist,  
A-L frame winches, cord and well drillers (one drum), post hole  
digger, model CHB Vibro-Tamp or similar machine, batch bin and  
plant operator, dinkey locomotive, skid steer loader, track  
excavator 5/8 cu. yd. or smaller.*

**GROUP 5:** *Fork lift, high lift, lull, Oiler, fireman and heavy-  
duty greaser, boilers, and steam generators, pump, vibrator,  
motor mixer, air compressor, dust collector, welding machine,  
well point, mechanical heater, generators, temporary light  
plants, concrete pumps, electric submersible pump 4" and over,  
murphy type diesel generator, conveyor, elevators, concrete mixer  
and belcrete power pack (belcrete system), seeding, and mulching  
machines, pumps.*

**GROUP 6:** *Boom length premiums over GROUP II rates:*

*1 over 130 ft           .35*



<i>2 over 185 ft</i>	<i>.70</i>
<i>3 over 210 ft</i>	<i>1.50</i>
<i>4 over 250 ft</i>	<i>2.00</i>
<i>5 over 295 ft</i>	<i>2.50</i>

**GROUP 7: Tower Crane Premium over GROUP II rates:**

<i>1 over 5 stories</i>	<i>.50</i>
<i>2 over 10 stories</i>	<i>1.50</i>
<i>3 over 15 stories</i>	<i>2.00</i>
<i>4 over 20 stories</i>	<i>2.50</i>

**GROUP 8: Master Mechanic (other than nuclear work)****GROUP 9: Master Mechanic on nuclear work****-----**  
**ENGI0137B 03/04/2002****Rates            Fringes****DUTCHESS COUNTY (POUGHKEEPSIE AND SOUTH THERE-OF)****BUILDING CONSTRUCTION****POWER EQUIPMENT OPERATORS:**

<b>GROUP 1-A</b>	<b>32.90</b>	<b>16.60+a</b>
<b>GROUP 1-B</b>	<b>30.40</b>	<b>16.60+a</b>
<b>GROUP 2-A</b>	<b>31.80</b>	<b>16.60+a</b>
<b>GROUP 3-A</b>	<b>30.65</b>	<b>16.60+a</b>
<b>GROUP 3-B</b>	<b>29.20</b>	<b>16.60+a</b>
<b>GROUP 4-A</b>	<b>30.35</b>	<b>16.60+a</b>
<b>GROUP 4-B</b>	<b>29.00</b>	<b>16.60+a</b>
<b>GROUP 5-A</b>	<b>29.20</b>	<b>16.60+a</b>
<b>GROUP 5-B</b>	<b>27.70</b>	<b>16.60+a</b>
<b>GROUP 6-A-1</b>	<b>34.55</b>	<b>16.60+a</b>
<b>GROUP 6-A-2</b>	<b>33.50</b>	<b>16.60+a</b>
<b>GROUP 6-A-3</b>	<b>32.35</b>	<b>16.60+a</b>
<b>GROUP 6-A-4</b>	<b>35.05</b>	<b>16.60+a</b>
<b>GROUP 6-A-5</b>	<b>38.10</b>	<b>16.60+a</b>
<b>GROUP 6-A-6</b>	<b>30.05</b>	<b>16.60+a</b>
<b>GROUP 6-A-7</b>	<b>40.00</b>	<b>16.60+a</b>
<b>GROUP 6-B-1</b>	<b>26.30</b>	<b>16.60+a</b>
<b>GROUP 6-B-2</b>	<b>27.55</b>	<b>16.60+a</b>
<b>GROUP 6-B-3</b>	<b>27.60</b>	<b>16.60+a</b>
<b>GROUP 6-B-4</b>	<b>27.70</b>	<b>16.60+a</b>
<b>GROUP 6-B-5</b>	<b>30.15</b>	<b>16.60+a</b>

**NOTES: Hazmat: 20% above regular rate**

**Pumping operation Premium .50**  
**Crane Operators (100-149 ft) 2.00**  
**Crane Operators (149 ft +) 3.00**  
**Loader Operators (over 5 cu yd) .50**  
**Shovel Operators (over 4 cu yd) 1.00**

**FOOTNOTE:**

**a. New Years Day, Memorial Day, Independence Day, Labor Day  
 Thanksgiving Day, Christmas Day, plus Lincoln's Birthday,  
 Washington's Birthday, Good Friday, Columbus Day,  
 November Election Day, Veteran's Day.**

**POWER EQUIPMENT OPERATORS CLASSIFICATION**

**GROUP 1-A: Carrier- trailer horse; concret-portable hoist; crane  
 & hoist engineer-steel (concrete, material, super structure sub-  
 structure); derrick (stone-steel); elevator & cage; hoist-  
 single/double or triple drum; hoist-portable mobile unit; hoist  
 engineer-concert (crane-derrick-mine hoist); hoist engineer-  
 material; overhead crane; power house plant; telephies  
 (cableway); whirly; maintenance engineer; Lull hiliift or similar;  
 hydraulic crane 25 ton and over; cherry picker 25 tons and over;  
 backhoe Oliver 88; fordson; dynahoe; dual purpose and similar  
 machines; Barber Green Loader-euclid loader or similar type;  
 conway or similar mucking macking machines; dragline; gradall;  
 shovel; backhoe etc. (crawler or truck); front end loaders;  
 hydraulic boom; jersey spreader; lift slab console; letournequ or  
 tounapull (scrapers over 20 yds struck); mucking machines;  
 pavement breaker (air ram); paver (concrete); road boring  
 machine; road mix machines; ross carrier and similar machines;  
 post hole digger; shovel (tunnels); side boom; spreader  
 (asphalt); scoopmobile-tractor-shovel over 1 1/2 yds. trenching  
 machines vermeer concrete saw trencher and similar; tractor type  
 demolition equipment; winch truck (a frame); hydraulic crane over  
 10 ton up to 25 ton); cherry picker over 10 ton up to 25 ton)**

**GROUP 1-B: Compressor (steel erection); pulse meter and push  
 button buzz box; elevator; mechanic (outside) all types; welder;**

**scrapers 20 yds struck and under; machine pulling sheep's foot  
 roller; vibratory rollers; roller 4 tons and over.**

**GROUP 2-A: Compactor self-propelled; grader; bulldoze D7 and  
 similar tractors with a draw bar horsepower of 100 or over;**

*bulldozer D6 and under; welder; scraper 20 yds struck and under; machine pulling sheep's foot roller; vibratory rollers.*

*GROUP 3-A: Asphalt plant; boiler (high pressure); concrete mixing plants; concrete pump; firemen; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes); mixer concrete - 21E and over; portable asphalt plant; portable batch plant; portable crusher; quarry master; stone crusher; well drilling machine and well point system; cherry picker under 10 tons; hydraulic crane under 10 tons; concert buffy; one yard an up ride on dumper (benford or similar).*

*GROUP 3-B: Compressor over 125 cu. feet; conveyor belt machine regardless of size; lighting unit (portable & generator); welding machine (steel erection and excavation); and compressor plant; stud machine; ladder hoist.*

*GROUP 4-A: Air tractor drill; batch plant; bending machine; concrete breaker; concrete spreader; curb cutter machine; farm tractor (all types); finishing machine-concrete; hepavac clean air machine (all similar types: removal of asbestos etc.); material hopper-sand-stone-cement; mixer-concrete-under 21E; mulching grass spreader; pump-gypsum, etc., pump-plaster-grout -fireproofing; shop mechanic (not employed on job site); roller under 4 ton; spreading and fine grading machine; steel cutting machine; syphon pump-air-steam; tar joint machine; turbo jet burner or similar equipment; vibrator (1 to 5); fine grading machine; roof hoist (tugger hoist); television cameras-water-sewer-gas-etc.*

*GROUP 4-B: Compressor to 135 feet; dust; dust collector; heater all types; pump; pump station (water and sewer); steam jenny; sweeper; chipper; mulcher.*

*GROUP 5-A: Concrete saw; oiler fuel truck and oiler grease truck.*

*GROUP 5-B: Oiler; paint compressor; motorized roller (walk behind); stockroom attendant.*

*GROUP 6-A-1: master mechanic.*

*GROUP 6-A-2: helicopter hoist operator.*

*GROUP 6-A-3: welder-certified.*

*GROUP 6-A-4: engine-pile driver.*

*GROUP 6-A-5: helicopter-pilot*

**GROUP 6-A-6: helicopter-signalman**

**GROUP 6-A-7: Engineers for all tower cranes, all climbing cranes and all cranes of 100 ton capacity or greater (3900 Manitowac or**

**similar) irrespective of manufacturer and regardless of how the same is rigged (except for pile rigs).**

**GROUP 6-B-1: Utility man.**

**GROUP 6-B-2: warehouse man.**

**GROUP 6-B-3: oiler (asphalt paver)**

**GROUP 6-B-4: cable splicer.**

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**ENGI0137C 03/04/2002**

**Rates                      Fringes**  
**DUTCHESS (Poughkeepsie and South thereof)**

**POWER EQUIPMENT OPERATORS (HEAVY & HIGHWAY)**

<b>GROUP 1</b>	<b>37.34</b>	<b>16.76+a</b>
<b>GROUP 1-A</b>	<b>33.07</b>	<b>16.76+a</b>
<b>GROUP 1-B</b>	<b>34.21</b>	<b>16.76+a</b>
<b>GROUP 2-A</b>	<b>31.72</b>	<b>16.76+a</b>
<b>GROUP 2-B</b>	<b>31.85</b>	<b>16.76+a</b>
<b>GROUP 3</b>	<b>31.19</b>	<b>16.76+a</b>
<b>GROUP 4-A</b>	<b>28.47</b>	<b>16.76+a</b>
<b>GROUP 4-B</b>	<b>24.65</b>	<b>16.76+a</b>
<b>GROUP 5-A-1</b>	<b>34.94</b>	<b>16.76+a</b>
<b>GROUP 5-A-2</b>	<b>33.89</b>	<b>16.76+a</b>
<b>GROUP 5-A-3</b>	<b>42.10</b>	<b>16.76+a</b>
<b>GROUP 5-A-4</b>	<b>37.72</b>	<b>16.76+a</b>
<b>GROUP 5-A-5</b>	<b>32.65</b>	<b>16.76+a</b>
<b>GROUP 5-A-6</b>	<b>38.38</b>	<b>16.76+a</b>
<b>GROUP 5-A-7</b>	<b>31.58</b>	<b>16.76+a</b>
<b>GROUP 5-A-8</b>	<b>31.86</b>	<b>16.76+a</b>
<b>GROUP 5-B-1</b>	<b>23.52</b>	<b>16.76+a</b>
<b>GROUP 5-B-2</b>	<b>26.71</b>	<b>16.76+a</b>
<b>GROUP 5-B-3</b>	<b>23.18</b>	<b>16.76+a</b>

**POWER EQUIPMENT OPERATORS CLASSIFICATIONS (HEAVY & HIGHWAY)**

**GROUP 1: Boom Truck; Cherry Picker; Clamshell; Crane, (Crawler,**

***Truck); Dragline; Rough Terrain Crane***

***GROUP 1-A: Auger; Auto Grader; Dynahoe and Dual purpose and similar machines; Boat Captain; Boring Machine (all types); Bull Dozer- all sizes; Central Mix Plant Operator; Chipper-all types; Close circuit t.v.; Compactor with Blade; Concrete Portable Hoist; C.M.I. or similar; Conway or similar mucking machines; Gradall, Shovel Backhoe, etc. Grader; Derrick, (Stone- Steel; Elevator & cage, materials or passengers; Front end loaders over 1 1/2 yds.; Hoist Single, Double, Triple Drum, Hoist Portable Mobile Unit; Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist); Hoist Engineer-Material, Hydraulic Boom; Letourneau or Tournapull (Scrapers over 20 yds. struck); Log Skidder; Movable Concrete Barrier Transfer & Transport Vehicle; mucking machines; overhead crane; paver (concrete); pulsemeter; push button (buzz box)***

***elevator; road mix machines; Robot Hammer (brock or similar), Ross carrier and similar machines; shovels (tunnels); side boom; Slip Form Machine; spreader (asphalt); scoopmobile-tractor-shovel over 1 1/2 yards; trenching machines; telephies-vermeer concrete saw trencher and/or similar; tractor-type demolition equipment, Whirly***

***GROUP 1-B: Road Paver, Asphalt***

***GROUP 2-A: Balast Regulators; Compactor self-propelled; Cow Tracks; Fusion Machine; Rail Anchor Machines; Roller 4 ton and over; Scrapers - 20 yards struck; Switch Tampers; Vibratory roller, etc.***

***GROUP 2-B: Mechanic (outside) all types***

***GROUP 3-A: Air tractor drill; asphalt plant; batch plant; boiler (high pressure; concrete breaker; concrete pump concrete spreader; curb cutter machine; farm tractor (all types); finishing machine (concrete); fine grading machine; fireman; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes), maintenance engineer; machine pulling sheeps foot roller; material hopper; mixer concrete - 21-E and over; mulching grass spreader; portable asphalt plant, portable batch plant, portable crusher; powerhouse plant; quarry master; roller under 4 ton; spreading and fine grading machine; steel cutting machine; stone crusher; sweeper; turbojet burner or similar; well drilling machine ; winch truck "A" frame. John Henry Drill or similar.***

**GROUP 4-A: Service men (fuel or grease truck).**

**GROUP 4-B: Oiler; Compressor - compressor plant; paint compressor -steel erection; conveyor belt machine; lighting unit (portable & generator); oiler; pumps - pump station-water-sewer-gypsum- plaster, etc.; roller-motorized (walk-behind); welding machine (steel erection excavation); well point system; bending machine; dust collector; mixer - concrete under 21-E; heater all types; steam jenny; syphon pump-air-steam; tar joint machine; vibrator (1 to 5); Compressor Truck Mounted (2-6)**

**GROUP 5-A-1: Master Mechanic**

**GROUP 5-A-2: Helicopter hoist operator.**

**GROUP 5-A-3: Engineer - all tower cranes, all climbing cranes and all cranes of 100 ton capacity or greater (3900 Manitowac or similar) irrespective of manufacturer and regardless of how the same is rigged (except for pile rigs).**

**GROUP 5-A-4: Hoist Engineer - steel - sub-structure; Engineer--Pile Driver**

**GROUP 5-A-5: Welder-Certified**

**GROUP 5-A-6: Helicopter - pilot.**

**GROUP 5-A-7: Helicopter - signalman.**

**GROUP 5-A-8: Jersey-spreader, pavement breaker (air ram); Post Hole Digger**

**GROUP 5-B-1: Utility Man**

**GROUP 5-B-2: Concrete Saw**

**GROUP 5-B-3: Oiler**

**NOTES:**

**Loader Operator (over 5 cu yds) .50**

**Shovel Operators (over 4 cu yd) 1.00**

**Hazmat premium over regular rate 20%**

**FOOTNOTE:**

**a. PAID HOLIDAYS: New Year's Day; Lincoln's Birthday; Good**

*Friday; Memorial Day; Independence Day; Labor Day; Veterans Day; Columbus Day; November Election Day; Thanksgiving Day; and Christmas Day*

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**ENGI0825K 07/01/2002**

**Rates                      Fringes**  
**ORANGE, ULSTER AND SULLIVAN COUNTIES**

**POWER EQUIPMENT OPERATORS (BUILDING HEAVY & HIGHWAY):**

<b>GROUP 1</b>	<b>32.87</b>	<b>17.15+a</b>
<b>GROUP 2</b>	<b>31.28</b>	<b>17.15+a</b>
<b>GROUP 3</b>	<b>29.37</b>	<b>17.15+a</b>
<b>GROUP 4</b>	<b>27.74</b>	<b>17.15+a</b>
<b>GROUP 5</b>	<b>26.03</b>	<b>17.15+a</b>
<b>GROUP 6</b>	<b>34.69</b>	<b>17.15+a</b>

**NOTES:**

*Hazmat Premium                      20%*  
*Hydrographic Premium              .50*

**POWER EQUIPMENT OPERATORS CLASSIFICATIONS (BLDG, HEAVY & HWY)**

**GROUP 1: Autograde-Pavement-Profiler (CMI and Similar Type); utograde-Pavement-Profiler (CMI and Similar Types);Autograde Slipform Paver (CMI and Similar Types); Backhoe; Central Power Plants (all types); Concrete Paving Machine (s-240 and Similar Types); Cranes (All Types, Including Overhead and Straddle Traveling Type); Cranes, Gantry; Derricks (Land, Floating or Chicago Boom Type); Drillmaster/Quartmaster (Down the Hole Drill) Rotary Drill; Self-Propelled, Hydraulic Drill, Self-Powered Drill Draglines, Elevator Graders, Front End Loaders (5 yds. and over), Gradalls, Grader: Rago, Helicopters (Copilot), Helicopters, (Communication Engineer), Locomotive (large), Mucking Machines,**

**Pavement and Concrete Breaker (Superhammer, Hoe Ram, Brokk 250 and Similar Types), Pile Driver (length of boom including length of leads shall determine premium rate applicable), Roadway Surface Grinder Scooper (loader and shovel), Shovels, Tree Choooper with Boom, Trench Machines, Tunnel Boring Machines.**

**GROUP 2: "A" Frame; Backhoe (Combination); Boom Attachment on Loaders (Rate based on size of bucket) not applicable to Pipehook) Boring and Drilling Machines, Brush Chopper, Shredder and Tree Shredder Tree Shearer, Cableways, Carry-alls, Concrete Pump, Concrete Pumping System, Pumpcrete and Similar Types,**

*Conveyors, 125 ft and over; Drill Doctor (duties include dust collector, maintenance), Front End Loader (22 yds. but less than 2 yds.), Graders (Finish); Groove Cutting Machine (ride on type), Heater Planer; Hoists: (all type hoists, Shall Also Include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft, Caisson, Snorkel Roof, and or any other similar type Hoisting Machines, Portable or Stationary, Except Chicago Boom Type). Long Boom Rate to Be Applied if Hoist is "outside material lower hoist"; Hydraulic Cranes-10tons and Under; Hydro-Axe; Hydro-Blaster; Jacket (Screw Air Hydraulic Power Operated Unit or Console Type: Not Hand Jack or Pile Load Test Type), Log Skidder; Pans, Pavers (all) Concrete; Plate and Frame Filter Press; Pumpcrete Machines; Squeeze Crete and Concrete Pumping (regardless of size); Scrapers; Sidebooms; Straddle Carrier, Ross and Similar Types; Vacuum Truck; Whip Hammer; Winch Trucks (Hoisting).*

*GROUP 3: Asphalt Curbing Machine, Asphalt Plant Engineer, Asphalt Spreader; Autograde Tube Finisher & Texturing Machine (CMI and Similar types) Autograde Curecrete Machine (CMI and Similar Types); Bar Bending Machines (power), Batchers, Batching Plant and Crusher on-site; Belt Conveyor Systems; Boom Type Skimmer Machines; Bridge Deck Finisher; Bulldozers (all); Car Dumpers (A:road); Chief of Party; Compressor and Blower Type Units (used Independently or Mounted On Dual Purpose Trucks, On Job Site or In Conduction with Job Site, In Loading and Unloading of Concrete, Cement, Fly Ash, Instantcrete, or Similar Type Materials); Compressor 92 or 3 in Battery); Concrete Finishing Machines; Concrete Saws and Cutters (ride on type); Concrete Spreaders, Hetzel, Rexomatic and Similar types; Concrete Vibrators; Conveyors, Under 125 ft), Crushing Machines, Ditching Machine, Small (ditchwitch, Vermeer or Similar type); Dope Dots (mechanical with or without pump), dumpsters; Elevator; Fireman; Forklifts (economobile, lull, and similar types of equipment); Front End Loaders (1 yd. and over but less than 2 yds.); Generators (2 or 3 in Battery/ within 100 ft); Giraffe Grinders, Graders and Motor Patrols; Grout Pump; Gunnite Machines (excluding nozzle); Hammer Vibratory (in conduction with generators); Hoists (Roof, Tuggeraerial Platfrom Hoist and House Cars), Hoppers, Hoppers Doors (power operated); Hydro-Blaster (where required); Ladders (Motorized); Laddervator; Locomotive, Dinky type; Maintenance, Utility Man; Mechanics; Mixers (Excepting Paving Mixers); Motor Patrols and Graders; Pavement Breakers, Small, Self-Propelled ride on type (also maintains compressor or hydraulic unit); Pavement Breaker, Truck Mounted;*



*Pipe Bending Machine (power); Pitch Pump; Plaster Pump (regardless of size); Post Hole Digger (post pounder and auger); Rod Bending Machines (power); Roller, Black Top; Scales, (power); Seaman Pulverizing Mixer; Shoulder Widener; Silos; Skimmer Machines (Boom Type); Steel Cutting Machine, Services and Maintains; Tamrock Drill; Tractors; Tug Captain; Vibrating Plants (used in conduction with unloading); welder and Repair Machines. Concrete cleaning/decontamination machine operator; Directional boring machine; Heavy equipment robotics operator; Master environmental maintenance operator; Ultra high pressure waterjet cutting tool system operator; maintenance operator; Vacuum blasting machine operator*

*GROUP 4: Brooms and Sweepers; Chippers; Compressors (single); Concrete Spreaders (small type); Conveyor Loaders (not including Elevator Graders); Engines, Large Diesel (1620 h.p.) and Staging Pump; Farm Tractors; Fertilizing Equipment (Operator and Maintenance of); Fine Grade Machine (small type); Form Line Graders (small type); Front End Loader (under 1 yd); Generator (single); Grease, Gas, Fuel and Oil Supply Trucks; Heaters (Nelson or Other Type Including Propane, Natural Gas or Flowtype Units); Lights, Portable Generating Light Plants; Mixers, Concrete Small; Mulching Equipment (Operation and Maintenance of); Pumps (2 of Less Than 4 Inch Suction); Pumps 94 Inch Suction and Over Including Submersible Pumps); Pumps (Diesel Engine and Hydraulic); Immaterial of Power; Road Finishing Machines (Small Type); Rollers, Grade, Full Or Stone Base; Seeding Equipment (Operation and maintenance of); Sprinkler and Water Pump Trucks (Used on job Site or in conduction with Job Site); Steam Jennies and Boilers, Irrespective of Use; Stone Spreader; Tamping Machines, Vibrating Ride On; Temporary Heating Plant (nelson or Other Type, Including Propane, Natural Gas or Flow Type Units); Water and Sprinkler Trucks (Used On Job Site In Conduction with Job Site); Welding Machines-Within 100 ft (Gas, and /or Electric Converters of any type, single, tow or three in a battery). welding system, multiple (rectifier transformer type) well point systems (including installation by bull gang and maintenance of); Off Road back dumps.*

**GROUP 5: Oiler**

**GROUP 6: Helicopter Pilot**

**FOOTNOTE:**

- a. **PAID HOLIDAYS:** New Years Day, Washington's Birthday Memorial Day, July 4th, Labor Day, Veteran's Day, Election

*Day, Thanksgiving Day, and Christmas Day, provided the employee works one day during the calendar week in which the holiday occurs*

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**ENGI0825L 07/01/2001**

**Rates                      Fringes**  
**ORANGE, ULSTER AND SULLIVAN COUNTIES**

**POWER EQUIPMENT OPERATORS**  
**BUILDING CONSTRUCTION STEEL ERECTION**

<b>GROUP 1</b>	<b>34.64</b>	<b>16.20+a</b>
<b>GROUP 2</b>	<b>33.73</b>	<b>16.20+a</b>
<b>GROUP 3</b>	<b>31.44</b>	<b>16.20+a</b>
<b>GROUP 4</b>	<b>28.78</b>	<b>16.20+a</b>
<b>GROUP 5</b>	<b>27.25</b>	<b>16.20+a</b>
<b>GROUP 6</b>	<b>25.49</b>	<b>16.20+a</b>
<b>GROUP 7</b>	<b>35.50</b>	<b>16.20+a</b>

**NOTES:**

<b>Hydrographic Premium</b>	<b>.50</b>
<b>Hazmat Premium</b>	<b>20%</b>
<b>Tunnel Premium</b>	<b>.75</b>

**STEEL ERECTION CLASSIFICATIONS**

**GROUP 1: Cranes (All Cranes, Land or Floating with Booms Including Jib 140 ft and over, Above Ground); Derricks, Land, Floating or Chicago Boom Type with Booms including Jib 140 ft and over above ground).**

**GROUP 2: Cranes (All Cranes, Land or Floating with Booms Including Jib Less Than 140 ft Above Ground); Derricks, Land, Floating or Chicago Boom Type with Booms Including Jib Less Than 140 ft above Ground).**

**GROUP 3: "A" Frame, Cherry Pickers 10 tons and under, Hoists Shall Also Include Steam, Gas, Desel, Electric, Air Hydraulic, Single and Double Drum Concrete, Brick Shaft Caisson, or Any Other Similar Type Hoisting Machines, Portable or Stationary, Except Chicago Boom Type; Jacks: Screw Air Hydraulic Power Operated unit or Console Type (not hand Jack or Pile Load Test Type); Side Booms.**

**GROUP 4: Aerial Platform used as Hoist; Compressor: 2 or 3 in**

*Battery; Elevators or House Cars; Conveyors and Tugger Hosits;  
Chief of Party; Firemanp; Forklift; Generators (2 or 3);  
Maintenance (Utility Man); Rod Bending Machine (power); Welding  
Machines (Gas or Electric, 2 or 3 in Battery, Including Diesels);  
Captain: Power Boats: Tug Master: Power Boats.*

*GROUP 5: Compressor, Single; Welding Machine, Single, Gas,  
Diesel, and Electric Converters of any Type: Welding System  
Multiple (Rectifier Transformer Type); Generator, Single.*

*GROUP 6: Oiler*

*GROUP 7: Helicopter Pilot .*

**FOOTNOTE:**

*a. PAID HOLIDAYS: New Years Day, Washington's Birthday,*

*Memorial Day, Independence Day, Labor Day, Veteran's Day,  
Election Day, Thanksgiving Day, and Christmas Day, provided  
the employee works one day in the calendar week during  
which the holiday occurs.*

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**POWER EQUIPMENT OPERATORS  
BUILDING CONSTRUCTION TANK ERECTION**

<b>GROUP 1</b>	<b>34.36</b>	<b>16.20+a</b>
<b>GROUP 2</b>	<b>33.52</b>	<b>16.20+a</b>
<b>GROUP 3</b>	<b>35.00</b>	<b>16.20+a</b>
<b>GROUP 4</b>	<b>31.43</b>	<b>16.20+a</b>
<b>GROUP 5</b>	<b>26.22</b>	<b>16.20+a</b>

**NOTES:**

<b>Tunnel Premium</b>	<b>.75</b>
<b>Hazmat Premium</b>	<b>20%</b>
<b>Hydrographic Premium</b>	<b>.50</b>

**TANK ERECTION CLASSIFICATIONS**

**GROUP 1: Operating Engineers on all Cranes, Derricks, ets with  
Booms Including Jib 140 ft or More Above Ground.**

**GROUP 2: Operating Engineer on all Equipment, Including Cranes,  
Derricks, ets with Booms Including Jib, Less Than 140 ft above  
the ground.**

**GROUP 3: Helicopter Pilot Engineer.**

**GROUP 4: Air Compressors, Welding Machines and Generators are Covered and are Defined as Cover: Gas, Diesel, or Electric Driven Equipment and Sources of Power from a Permanent Plant: ie: Staem, Comgressed Air, Hydraulic or Other Power, For The Operating of any Machine or Automatic Tools, Used In The Erection, Alteration, Repair and Dismantling of Tanks and Any and All "Dual Purpose" Trucks Used On The Construction Job Site, or in the Loading and Unloading of Materials, at the Construction Job Sited or in Conjunction with the Job Site.**

**GROUP 5: Oiler****FOOTNOTE:**

**a. PAID HOLIDAYS: New Years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day provided the Employee works one day in the calendar week during which the holiday occurs**

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**POWER EQUIPMENT OPERATORS**

**OILOSTATIC MAINLINES AND TRANSPORTATION PIPE LINES:**

<b>GROUP 1</b>	<b>32.50</b>	<b>16.20+ a</b>
<b>GROUP 2</b>	<b>30.85</b>	<b>16.20+ a</b>
<b>GROUP 3</b>	<b>28.71</b>	<b>16.20+ a</b>
<b>GROUP 4</b>	<b>27.21</b>	<b>16.20+ a</b>
<b>GROUP 5</b>	<b>25.49</b>	<b>16.20+ a</b>
<b>GROUP 6</b>	<b>34.43</b>	<b>16.20+ a</b>

**NOTES:**

<b>Hydrographic Premium</b>	<b>.50</b>
<b>Hazmat Premium</b>	<b>20%</b>
<b>Tunnel Premium</b>	<b>.75</b>

**OILSTATIC MAINLINES AND TRANSPORTATION PIPE LINES  
CLASSIFICATIONS**

**GROUP 1: Backhoe; Cranes (all types); Draglines, Front End Loaders (5yds. and over), Gradalls, Helicopters (co-pilot), Helicopters (Communication Engineer); Scooper (Loader and Shovel) Koehring; Trench Machines.**

**GROUP 2: "A" Frame; Backhoe (Combination Hoe Loader); Boring and Drilling Machines; Ditching Machines, Small, Ditchwitch, Vermeer or Similar type; Forklifts; Front End Loaders 92 yds. and over but less than 5 yds.); Graders, Finish (fine); Hydraulic Cranes 10 tons and under (over 10 tons) Cranes Rate Applies); Side Booms; Winch Trucks (Hoisting).**

**GROUP 3: Backfiller; Brooms and Sweepers; Bulldozers; Compressor (2 or 3 in battery); Chief of Party; Front End Loaders (under 2 yds); Generators; Giraffe Grinders; Graders and Motor Patrols; Machnic; Pipe Bending Machine (power); Tractors; Water and Sprinkler Trucks used on Job Site or in Conduction with Job Site); Welder and Repair Mechanic; Captain (power boats); Tug Master (power boats).**

**GROUP 4: Compressor (single); Dope Pots (Mechanical with or without Pump); Dust Collectors; Pumps (4 inch suction and over); Pumps (2 of less than 4 inche suction); Pumps, Diesel Engine and Hydraulic (immaterial of power); Welding Machines, Gas or Electric Converters of any type- 2 or 3 in Battery Multiple Welders; Well Point Systems (including installation and Maintenance); Fram Tractors.**

**GROUP 5: Oiler, grease, gas, fuel and oil supply trucks; Tire repair and maintenance**

**GROUP 6: Helicopter Pilot**

**FOOTNOTE:**

**a. Paid Holidays: New Years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day,**

**Election Day, Thanksgiving Day, and Christmas Day Provided the Employee works one day in calendar week during which the holidays occurs.**

**\* IRON0417A 07/01/2002**

	<b>Rates</b>	<b>Fringes</b>
<b>IRONWORKERS</b>	<b>31.30</b>	<b>19.05</b>

**LABO0017M 07/01/2002**

	<b>Rates</b>	<b>Fringes</b>
<b>ORANGE, ULSTER, AND SULLIVAN COUNTIES</b>		

**LABORERS****BUILDING CONSTRUCTION:**

<b>GROUP 1</b>	<b>20.30</b>	<b>11.10</b>
<b>GROUP 2</b>	<b>23.55</b>	<b>11.10</b>
<b>GROUP 3</b>	<b>25.35</b>	<b>11.10</b>
<b>GROUP 4</b>	<b>28.10</b>	<b>11.10</b>

**LABORERS BUILDING CLASSIFICATIONS**

**GROUP 1:** Custodial work, flag person, portable generator tender, portable pump tender, pitman and dumpman, firewatch, temporary heat tender, temporary light tender, traffic control, tool room tender

**GROUP 2:** Artificial turf, air chipping hammer acoustic pump and mixer, carpenter tender, concrete, concrete curb and sidewalk form setter, concrete form stripping, concrete sealing, concrete curing, concrete finisher, concrete vibrator, compressor, clean up after trades, dismantling demolition, excavation, fireproofing, foundation and building piping, pump and mixer, gunite, general clean up, grade checker, grading and backfilling, hoists, hod carrier, landscaping, mason tender, multi building trades tender, jackhammer, pavement breaker, poured gypsum roof work, power tampers, power walk behind roller, pressure blasting, power mixer, scaffolding, snow removal, signal person, sandblasting, styrofoam and similar installation, radio control equipment including but not limited to radio control tampers and rollers, radio control excavator, all erecting and dismantling of scaffold for masonry regardless of height, walking and riding power buggies, temporary weather protection, wrecking, waterproofing, stone and tile setter, radio controlled hammers and breakers, unloading of trucks, air track, assembling and placing gabion baskets, asphalt, blaster, bob cat type machine for demo and clean up, chain link fence, chain saw, chipping hammer, concrete conveyor belt, saw, core drill, corrugated pipe, construction specialist, cleaning machine, concrete form setter, conduit layer, cutting torch, discharge pipe, drill chuck tender, duct bank layer, explosive handler, hydraulic splitter, granite or stone curbing, handler, joy and jib drill, IngersollRand heavy

duty crawler master type HCMZ drill machines or equivalent, laser level, nonmetallic pipe layer, metallic pipe layer, LeRoi hydraulic drill or similar, mega mixer, power fork lift,

*prestressed and precast concrete, power brush cutter, pump crete machine, retaining walls, rip rap, retention and toxic and hazardous waste liners, setting of block, setting of block, setting of brick, setting of stone, sound barriers, transit under laborers jurisdiction, tow behind concrete or grout pump, traffic and pedestrian stripping, surface planner, manufactured curb, walk behind durface planner, wagon drill, welding*

**GROUP 3: Forklift for masonry purposes**

**GROUP 4: Asbestos Abatement work, toxic and hazardous abatement, lead abatement work, environmental work.**

**DUTCHESS COUNTY (Asbestos, lead, toxic and hazardous waste abatement and any other environmental related work)**

### **BUILDING CONSTRUCTION**

<b>GROUP 1:</b>	<b>23.55</b>	<b>11.10</b>
<b>GROUP 2:</b>	<b>28.10</b>	<b>11.10</b>

### **BUILDING CLASSIFICATIONS**

**GROUP 1: Asbestos abatement work, lead abatement work, toxic and hazardous waste related work; when protective equipment and clothing are not required.**

**GROUP 2: Asbestos abatement work, toxic and hazardous abatement, lead abatement work, environmental work.**

### **ORANGE, ULSTER AND SULLIVAN COUNTIES**

#### **LABORERS HEAVY & HIGHWAY:**

<b>GROUP 1:</b>	<b>20.20</b>	<b>11.50+a</b>
<b>GROUP 2:</b>	<b>25.60</b>	<b>11.50+a</b>
<b>GROUP 3:</b>	<b>30.20</b>	<b>11.50+a</b>
<b>GROUP 4:</b>	<b>31.20</b>	<b>11.50+a</b>

#### **FOOTNOTE:**

**a. PAID HOLIDAYS: New Years Day, President's Day, Memorial Day, Independence Day, Labor Day, Election Day, Veterans Day, Thanksgiving Day, Christmas Day**

## **LABORERS HEAVY AND HIGHWAY CLASSIFICATIONS**

**GROUP 1: Flagperson, gateperson**

**GROUP 2: General laborers, chuck tender, handling and**

*distributing drinking water, distributing all tools and supplies of laborers, nipper, powder carrier, magazine tender, warehouse laborers, concrete man, vibrator man, mason tender, mortar man, spraying, brushing and covering of concrete for curing and preservative purposes, traffic striper, scaffold builder, concrete curb and sidewalk form setter; permanent traffic striping and reflective devices, placing and maintenance of all flares, cones, lights, signs, barricades, traffic patterns, and all temporary reflective type materials for traffic control, custodial work, traffic directors, temporary heat or light tenders, tool room, dewatering pump men, pitman, dumpmen, snow removal and firewatch, asphalt man, joint setter, signal person, pipelayer, pipelining and relining, wellpoints, conduit and duct layer, wire puller rip rap and dry stone layer, steel rod carrier, core drill, rock splitter, Hilti gun air or electric, jackhammer, bush hammer, pavement breaker, chipping hammer, wagon drill, air track, jib rig, joy drill, gunite and sand blasting, coal passer and other machine operators, power tool operator, sprayer and nozzle man on mulching and seeding machine, all guard rail and fence, all seeding and sod laying, all landscape work, grade checker, all bridge work, walk behind self-propelled power saw, grinder, groover or similar type machine, walk behind tamper and roller of all types, salvage, stripping, wrecking and dismantling laborer (including barman, cutting torch and burner man), sheeting and shoring coming under laborers jurisdiction, bit grinder, operator of form pin puller and drivers, sandblasting, joint and jet sealer, filling and wiring baskets for gabion walls, permanent sign man, median barrier, sta-wall or similar type product, chain saw operator, railroad track laborer, waterproofer, pre-stressed and pre-cast concrete brick, block and stone pavers, power tools used to perform work usually done by laborers, power buggy and pumpcrete operator, fireproof, plaster and acoustic pump, asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous materials abatement when protective clothing and equipment is not required, power brush cutter, retention liners, artificial turf, retaining walls, walk behind surface planer, welding related to laborers work, remote controlled equipment normally operated by laborers, all technician work including but not limited to stitching,*



*seaming, heat welding, fireproof sprayer, mortar mixer, concrete finisher, form setter for concrete curbs and flatwork. Gunite nozzle man, stone cutters, granite stone layer, manhole, catch basin or inlet installing, lase men. Ground man on milling machine.*

*GROUP 3: Ingersoll Rand eavy duty crawler master type HCMZ any drill using 4" or larger bit, asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous material abatement when protective clothing and equipment is required, all working foremen including grade, pipe, concrete, clearing, blacktop, drill, paving and blaster etc., Hydraulic drill or similar, forklift for masonry only, Blaster and asphalt screedman.*

*GROUP 4: Asbestos, toxic, lead or hazardous material abatement foreman.*

*DUTCHESS COUNTY (Asbestos, Lead, toxic and hazardous waste abatement and any other environmental related work)*

#### **HEAVY & HIGHWAY CONSTRUCTION**

<b>GROUP 1:</b>	<b>25.60</b>	<b>11.50</b>
<b>GROUP 2:</b>	<b>30.20</b>	<b>11.50</b>

#### **HEAVY & HIGHWAY CLASSIFICATIONS**

*GROUP 1: Asbestos, toxic, bio-remediation, phyto-remediation, lead or hazardous material abatement; when protective equipment and clothing are not required.*

*GROUP 2: Asbestos toxic, bio-remediation, phyto-remediation, lead or hazardous materail abatement when protective clothing and equipment is required.*

#### **TUNNEL, SHAFT & CASSION WORK**

<b>GROUP 1</b>	<b>26.90</b>	<b>11.50+a</b>
<b>GROUP 2</b>	<b>31.25</b>	<b>11.50+a</b>

#### **FOOTNOTE:**

**PAID HOLIDAYS:** *New Years Day, Presidents's Day, Memorial Day, Independence Day, Labor Day, Election Day, Veterans Day,*

*Thanksgiving Day, Christmas Day*

**TUNNEL, SHAFT & CASSION CLASSIFICATIONS**

**GROUP 1: Laborer, Pit and Dumpman, Chuck Tender, Brakeman and Powder**

**GROUP 2: Miner and all mavhine men, Safety Miner, all shaft work, casson work, drilling, blow pipe, all air tools, tugger scaling, nipper gunniting srom pot to nozzle, bit grinder, singal man (top and bottom), shift steward, concrete man, shield driven tunnel, mixed face and soft ground liner plate tunnel in free air.**

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**LABO1000A 06/01/2002**

**Rates                      Fringes**

**DUTCHESS COUNTY**

**LABORERS (BUILDING CONSTRUCTION):**

<b>GROUP 1</b>	<b>22.20</b>	<b>12.50</b>
<b>GROUP 2</b>	<b>22.70</b>	<b>12.50</b>
<b>GROUP 3</b>	<b>24.55</b>	<b>12.50</b>

**LABORERS CLASSIFICATIONS (BUILDING)**

**GROUP 1: Mason tenders, carpenter tenders, laborer stripping and cleaning forms, laborer grading and digging ditches, sweepers, cleaners.**

**GROUP 2: Hod carriers, plasterers' tenders, scaffold builders (padlock and self-supporting scaffold 14 ft. or under all runways, mortar mixers) machine and hand, concrete mixers by machine under 21e, vibrators, form setters, asphalt rakers, handling reinforcement rods, drillers, jackhammer, operator, signalman, gunniting, motorbugs, water pump 2" or under barco machine, wreckers, paving breakers, power saw operators, other machine operators.**

**GROUP 3: Blasters, Laser beam operator.**

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**LABO1000D 05/01/2002**

**Rates                      Fringes**

**DUTCHESS COUNTY**

<b>GROUP 1</b>	<b>18.80</b>	<b>12.00+a</b>
<b>GROUP 2</b>	<b>22.56</b>	<b>12.00+a</b>
<b>GROUP 3</b>	<b>22.56</b>	<b>12.00+a</b>
<b>GROUP 4</b>	<b>23.56</b>	<b>12.00+a</b>

***GROUP 1: Flagperson, placing and maintenance of all flares, cones, light, signs, barricades, traffic control, custodial work, traffic directors, temporary heat or light tenders, tool rooms.***

***GROUP 3: Concrete Man, Signal Man, Pipelayer, Rip Rap, Dry Stone Layer, Jackhammer, Powderman, Highscalers, Power Buggy Operator, Steel Rod Carrier, Vibratory Operator, Other Machine Operator, Wrecking, Vibrator Operator-Compactor, Gunite and Sand Blasting, Water Pump 2" or under, Nipper, Chucker, Asphalt Workers.***

***a. PAID HOLIDAYS: New Years Day, Lincoln's Birthday, Good Friday, Washington's Birthday, November Election Day, Memorial Day, Independence Day, Labor Day, Columbus day, Thanksgiving Day and Christmas Day and Veteran's Day.***

*Rates Fringes*  
**DUTCHESS, ORANGE, SULLIVAN and**

<b>GLAZIERS</b>	<b>32.20</b>	<b>20.17</b>
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<b>PAINTER\PAPERHANGER</b>	<b>19.49</b>	<b>8.96</b>
<b>DRYWALL FINISHERS</b>	<b>19.49</b>	<b>8.96</b>
<b>SPRAY RATE</b>	<b>20.49</b>	<b>8.96</b>
<b>STRUCTURAL STEEL</b>	<b>29.74</b>	<b>8.96</b>

<b>BRIDGES, SWING STAGE,</b>	<b>29.74</b>	<b>8.96</b>
<b>BOATSWAIN CHAIR, PICK &amp;</b>		
<b>CABLES OVER 20 FEET</b>		
<b>LEAD ABATEMENT WORK</b>	<b>19.49</b>	<b>8.96</b>

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**PLUM0201B 04/01/2002**

**Rates      Fringes**

**DUTCHESS COUNTY AND THE REMAINDER  
OF ULSTER COUNTY**

<b>PLUMBERS AND STEAMFITTERS</b>	<b>26.00</b>	<b>17.33</b>
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**PLUM0373B 05/01/2002**

**Rates      Fringes**

**ZONE 1**

**ORANGE COUNTY**

**Towns of Lakeville, Four Corners, Sterling Forest, Tuxedo  
Park, Southfields, Arden, Newburgh Junction, Greenwood Lake,  
Monroe, Harriman, Woodbury Falls, Woodbury, Woodbury Station,  
Central Valley, and the Palisades Interstate Park and Bear  
Mountain Park**

<b>PLUMBERS &amp; STEAMFITTERS</b>	<b>31.72</b>	<b>16.40</b>
<b>REFRIGERATION</b>	<b>23.04</b>	<b>11.88</b>

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**PLUM0373C 05/01/2002**

**Rates      Fringes**

**ZONE 2**

**SULLIVAN COUNTY (Townships of Lumberland, Forestburgh, Highland,  
Tusten, Mamakating, Fallsburgh, Thompson, Bethel, Cohecton,  
Delaware, Freemont, Callicoon, Liberty, Monticello, Neversink and  
Rockland); ORANGE COUNTY (Remaining Townships) and ULSTER COUNTY  
(Towns of Shawangurk, Wawarsing, Plattekill, Marlboro and  
Ellenville up to Napanoch Prison)**

<b>PLUMBERS AND STEAMFITTERS</b>	<b>28.55</b>	<b>14.55</b>
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**ROOF0008B 07/01/2001**

**Rates      Fringes**

<b>ROOFER</b>	<b>29.08</b>	<b>18.78</b>
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**SFNY0669B 04/01/2002**

	<b>Rates</b>	<b>Fringes</b>	
<b>SPRINKLER FITTERS</b>	<b>33.50</b>	<b>6.05</b>	

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**SHEE0038A 07/01/2001**

	<b>Rates</b>	<b>Fringes</b>	
<b>SHEET METAL WORKERS</b>	<b>31.30</b>	<b>15.69</b>	

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**\* TEAM0445A 05/01/2002**

	<b>Rates</b>	<b>Fringes</b>
<b>TRUCK DRIVERS:</b>		
<b>GROUP 1</b>	<b>23.75</b>	<b>15.55+a</b>
<b>GROUP 2</b>	<b>23.65</b>	<b>15.55+a</b>
<b>GROUP 3</b>	<b>23.45</b>	<b>15.55+a</b>
<b>GROUP 4</b>	<b>23.35</b>	<b>15.55+a</b>
<b>GROUP 5</b>	<b>23.25</b>	<b>15.55+a</b>

**FOOTNOTE:**

**a. PAID HOLIDAYS:** *New Year's Day, Labor Day, President's Day, Presidential Election Day, Veterans Day, Decoration Day, Independence Day, Thanksgiving Day and Christmas Day provided the employee works two days in any calendar week during which the holidays occurs.*

**TRUCK DRIVER CLASSIFICATIONS**

**GROUP 1:** *Drivers on Letourneau tractors, double barrel euclids, Athey wagons and similar equipment (except when hooked to scrapers), drivers on low beds, I-beam and pole trailers, drivers of road oil distributors, tire trucks and tractors and trailers with 5 axles and over.*

**GROUP 2:** *Drivers on all equipment 25 yards and over, up to and including 30 yard bodies and cable dump trailers and powder and dynamite trucks.*

**GROUP 3:** *Drivers on all equipment up to and including 24 yard bodies, mixer trucks, dump crete trucks and similar types of equipment, fuel trucks and all other tractor trailers.*

**GROUP 4:** *Drivers on ten-wheelers, grease trucks and tillermen.*

***GROUP 5: Drivers on pick-up trucks used for materials & parts, drivers on escort man over-the-road and drivers on straight trucks.***

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***WELDERS - Receive rate prescribed for craft performing operation***

***to which welding is incidental.***

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***Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).***

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***In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.***

### ***WAGE DETERMINATION APPEALS PROCESS***

***1.) Has there been an initial decision in the matter? This can be:***

- \* an existing published wage determination***
- \* a survey underlying a wage determination***
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter***
- \* a conformance (additional classification and rate) ruling***

***On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.***

***With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:***

***Branch of Construction Wage Determinations  
Wage and Hour Division  
U. S. Department of Labor  
200 Constitution Avenue, N. W.  
Washington, D. C. 20210***

***2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:***

***Wage and Hour Administrator  
U.S. Department of Labor***

***200 Constitution Avenue, N. W.  
Washington, D. C. 20210***

***The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.***

***3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:***

***Administrative Review Board  
U. S. Department of Labor  
200 Constitution Avenue, N. W.  
Washington, D. C. 20210***

***4.) All decisions by the Administrative Review Board are final.  
END OF GENERAL DECISION***

**2. Replace Section 15950 with new attached Section 15951A.**

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15951A-1

## SECTION 15951A

DIRECT DIGITAL CONTROL FOR HVAC

**06/98**

### PART 1 GENERAL

#### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA)

AMCA Std 500 (11989; Rev994) Test Methods for Louvers,  
Dampers and Shutters

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.1 (1995) Code for Electricity Metering

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 269 (1996) Seamless and Welded Austenitic  
Stainless Steel Tubing for General Service

ASTM B 88 (1996) Seamless Copper Water Tube

ASTM B 88M (1996) Seamless Copper Water Tube (Metric)

ASTM D 635 (1997) Rate of Burning and/or Extent and Time  
of Burning of Self-Supporting Plastics in a  
Horizontal Position

ASTM D 1693 (1997a) Environmental Stress-Cracking of  
Ethylene Plastics

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING  
ENGINEERS (ASHRAE)

ASME INTERNATIONAL (ASME)

ASME B16.34 (199; B16.34a) Valves - Flanged, Threaded,  
and Welding End

ASME B40.1 (1991) Gauges - Pressure Indicating Dial Type  
- Elastic Element

ASME BPV VIII Div I (1998) Boiler and Pressure Vessel Code;  
Section VIII, Pressure Vessels Division 1 -  
Basic Coverage

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

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15951A-2

EIA ANSI/EIA/TIA 232-F (1991) Interface Between Data Technical  
Equipment and Data Circuit-Terminating  
Equipment Employing Serial Binary Data  
Interchange

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41 (1991; R 1995) Surge Voltages in Low-Voltage  
AC Power Circuits

IEEE Std 142 (1991) IEEE Recommended Practice for  
Grounding of Industrial and Commercial Power  
Systems

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S7.0.01 (1996) Quality Standard for Instrument Air

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (1991) Enclosures for Electrical Equipment  
(1000 Volts Maximum)

NEMA ICS 1 (1993) Industrial Control and Systems

NEMA ST 1 (1988) Specialty Transformers (Except  
General-Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)



NFPA 70 (1999) National Electrical Code  
NFPA 90A (1996) Installation of Air Conditioning and  
Ventilating Systems  
UNDERWRITERS LABORATORIES (UL)  
UL 94 (1996; Rev thru Jul 1998) Tests for  
Flammability of Plastic Materials for Parts  
in Devices and Appliances  
UL 268A (1998) Smoke Detectors for Duct Application  
UL 508 (1993; Rev thru Oct 1997) Industrial Control  
Equipment  
UL 555S (1996) Leakage Rated Dampers for Use in Smoke  
Control Systems

## 1.2 GENERAL REQUIREMENTS

The direct digital control (DDC) shall be a complete system suitable for the heating, ventilating and air-conditioning (HVAC) system.

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### Standard Products

Material and equipment shall be the standard products of Williams Electric Company, Inc. (WEC) temperature controls and Utility Control System (UCS).and each component shall provide the discrete functions specified. Combining of components or discrete component function by using multiple function devices which have not been specified, and deviation from indicated logic shall not be permitted. Items of equipment (individual control system components such as pressure sensors, controllers, temperature probes) shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening. All equipment, including installation materials, shall conform to the requirements of the Buy American Act or shall be of American manufacture and assembly. Specific acceptable items of foreign manufacture are identified herein. Any equipment or material which does not meet these requirements shall be subject to removal and replacement at no additional cost to the government.

### Identical Items

Items of equipment that perform the same function shall be identical, including equipment, assemblies, parts, and components.

### Configuration

The contractor shall configure the Direct Digital Control (DDC) system as described. System shall be listed per UL 916. Direct Digital Control panels shall be fully capable of controlling their respective systems with or without communication with any host computer system. The system shall provide operator interaction through the existing Williams Electric Company, Inc. temperature controls and UCS Central Operator System (COS) workstation. DDC panels shall manage all control functions within their data environment as specified. Every connected analog output (AO), analog input (AI), digital output (DO), and digital input (DI), represents a point where referred to in this specification.

### Connection to Base-Wide EMCS System

The contractor shall be responsible for connection and integration of the Direct Digital Control (DDC) system to the existing base-wide Williams Electric Company, Inc. temperature controls and UCS Energy Management and Control System (EMCS). This includes providing all controls, equipment, cabling, software, programming, installation, commissioning, and training unless noted otherwise.

### Database Definition and Graphic Generation

Contractor shall generate required database definitions compatible with the existing EMCS databases. They shall also generate complete and accurate

dynamic graphics representations of each air handling unit system and all other systems shall be identified on the I/O summary charts as well as complete building floor plans showing individual space sensed and set point temperature and humidity conditions.

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#### Sole Source Requirement

Notwithstanding Section 00700 Contract Clauses FAR 52.236-5, Material and Workmanship, DDC controllers, DDC/EMCS shall be manufactured by Williams Electric Company, Inc. in order that the systems installed are Williams Electric Company, Inc. temperature controls and UCS, and fully integrated and connected to the Base Williams Electric Company, Inc. temperature controls and UCS EMCS System. No other product will be acceptable. The Competition Advocate authorizes sole source procurement.

##### 1.2.1 Nameplates, Lens Caps, and Tags

Nameplates and lens caps bearing legends as shown and tags bearing deviceunique

identifiers as shown shall have engraved or stamped characters. A plastic or metal tag shall be mechanically attached directly to each device or attached by a metal chain or wire. Each airflow measurement station shall have a tag showing flow rate range for signal output range, duct size, and identifier as shown.

##### 1.2.2 Verification of Dimensions

After becoming familiar with all details of the work, the Contractor shall verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

##### 1.2.3 Drawings

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the mechanical, electrical, and finish conditions that could affect the work to be performed, shall arrange such work accordingly, and shall furnish all work necessary to meet such conditions.

##### 1.2.4 Power-Line Surge Protection

Equipment connected to ac circuits shall be protected from power-line surges. Equipment protection shall meet the requirements of IEEE C62.41. Fuses shall not be used for surge protection.

##### 1.2.5 Surge Protection for Transmitter and Control Wiring

DDC system control-panel equipment shall be protected against surges induced on control and transmitter wiring installed outside and as shown. The equipment protection shall be tested in the normal mode and in the common mode, using the following two waveforms:

- a. A 10-microsecond by 1,000-microsecond waveform with a peak voltage of 1,500 volts and a peak current of 60 amperes.
- b. An eight microsecond by 20-microsecond waveform with a peak voltage of 1,000 volts and a peak current of 500 amperes.

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##### 1.2.6 System Overall Reliability Requirement

The system shall be configured and installed to yield a mean time between failure (MTBF) of at least 40,000 hours. Each DDC controller shall be designed, configured, installed and programmed to provide for stand alone operation with minimal performance degradation on failure of other system components to which it is connected or with which it communicates.

##### 1.2.7 DDC System Network Accessibility

DDC controllers shall be located as shown on drawings or as approved by the Contracting Officers Representative.

#### 1.2.8 System Accuracy and Display

The system shall maintain an end-to-end accuracy for one year from sensor to operator's console display for the applications specified and shall display the value as specified. Each temperature shall be displayed and printed to nearest 0.1 degree F.

##### 1.2.8.1 Space Temperature

Space temperature with a range of 50 to 85 degrees F plus or minus 0.75 degree F for conditioned space; 30 to 130 degrees F plus or minus 1 degree F for unconditioned space.

##### 1.2.8.2 Duct Temperature

Duct temperature with a standard range plus or minus 2 degrees F for a specific application.

##### 1.2.8.3 Outside Air Temperature

Outside air (OA) temperature with a range of minus 30 to plus 130 degrees F plus or minus 2 degrees F; with a subrange of 30 to 100 degrees F plus or minus 1 degree F.

##### 1.2.8.4 Water Temperature

Water temperature with a range of 30 to 100 degrees F plus or minus 0.75 degree F; the range of 100 to 250 degrees F plus or minus 2 degrees F; and water temperatures for the purpose of performing Btu calculations using differential temperatures to plus or minus 0.5 degree F using matched sensors.

##### 1.2.8.5 High Temperature

High temperature with a range of 200 to 500 degrees F plus or minus 2.0 degrees F.

##### 1.2.8.6 Relative Humidity

Relative humidity, within a range of 20 to 80 percent, plus or minus 6.0 percent of range (display and print to nearest 1.0 percent).

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##### 1.2.8.7 Pressure

Pressure with a range for the specific application plus or minus 2.0 percent of range (display and print to nearest psi.)

##### 1.2.8.8 Flow

Flow with a range for the specific application plus or minus 3.0 percent of range, and flows for the purpose of thermal calculations to plus or minus 2.0 percent of actual flow (display and print to nearest unit, such as gallons per minute).

##### 1.2.8.9 KWh and kW Demand

KWh and kW demand with a range for the specific application plus or minus 1.0 percent of reading (display and print to nearest kWh or kW).

##### 1.2.8.10 Analog Value Input

An analog value input to the system's equipment via an AI with a maximum error of 0.50 percent of range, not including the sensor or transmitter error. This accuracy shall be maintained over the specified environmental conditions.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

HVAC Control System; G, AE

Drawings shall be on 34 by 22 inch sheets in the form and arrangement shown. The drawings shall use the same abbreviations,

symbols, nomenclature and identifiers shown. Each control system element on a drawing shall have a unique identifier as shown. The HVAC Control System Drawings shall be delivered together as a complete submittal. Deviations must be approved by the Contracting Officer. Drawings shall be submitted along with Submittal SD-01, Data.

a. HVAC Control System Drawings shall include the following:

Sheet One: Drawing Index, HVAC Control System Legend.

Sheet Two: Valve Schedule, Damper Schedule.

Sheet Three: Not Used

Sheet Four: Control System Schematic and Equipment Schedule.

Sheet Five: Sequence of Operation and Data Terminal Strip

Layout.

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Sheet Six: Control Loop Wiring Diagrams.

Sheet Seven: Motor Starter and Relay Wiring Diagram.

Sheet Eight: Communication Network and Block Diagram.

Sheet Nine: DDC Panel Installation and Block Diagram.

(Repeat Sheets Four through Seven for each AHU System.)

b. The HVAC Control System Drawing Index shall show the name and number of the building, military site, State or other similar designation, and Country. The Drawing Index shall list HVAC Control System Drawings, including the drawing number, sheet number, drawing title, and computer filename when used. The HVAC Control System Legend shall show generic symbols and the name of devices shown on the HVAC Control System Drawings.

c. The valve schedule shall include each valve's unique identifier, size, flow coefficient Cv, pressure drop at specified flow rate, spring range, positive positioner range, actuator size, close-off pressure data, dimensions, and access and clearance requirements data. Valve schedules may be submitted in advance but shall be included in the complete submittal.

d. The damper schedule shall contain each damper's and each actuator's identifier, nominal and actual sizes, orientation of axis and frame, direction of blade rotation, spring ranges, operation rate, positive positioner ranges, locations of actuators and damper end switches, arrangement of sections in multi-section dampers, and methods of connecting dampers, actuators, and linkages. The Damper Schedule shall include the maximum leakage rate at the operating static-pressure differential. The Damper Schedule shall contain actuator selection data supported by calculations of the torque required to move and seal the dampers, access and clearance requirements. Damper schedules may be submitted in advance but shall be included in the complete submittal.

e. Not Used

f. The HVAC control system schematics shall be in the form shown, and shall show all control and mechanical devices associated with the HVAC system. A system schematic drawing shall be submitted for each HVAC system.

g. The HVAC control system equipment Schedule shall be in the form shown. All devices shown on the drawings having unique identifiers shall be referenced in the equipment schedule. Information to be included in the equipment schedule shall be the control loop, device unique identifier, device function, setpoint,

input range, and additional important parameters (i.e., output range). An equipment schedule shall be submitted for each HVAC system.

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h. The HVAC control system sequence of operation shall reflect the language and format of this specification, and shall refer to the devices by their unique identifiers as shown. No operational deviations from specified sequences will be permitted without prior written approval of the Contracting Officer. Sequences of operation shall be submitted for each HVAC control system including each type of terminal unit control system.

i. The HVAC control system wiring diagrams shall be functional wiring diagrams which show the interconnection of conductors and cables to HVAC control panel terminal blocks and to the identified terminals of devices, starters and package equipment. The wiring diagrams shall show necessary jumpers and ground connections. The wiring diagrams shall show the labels of all conductors. Sources of power required for HVAC control systems and for packaged equipment control systems shall be identified back to the panel board circuit breaker number, HVAC system control panel, magnetic starter, or packaged equipment control circuit. Each power supply and transformer not integral to a controller, starter, or packaged equipment shall be shown. The connected volt-ampere load and the power supply volt-ampere rating shall be shown. Wiring diagrams shall be submitted for each HVAC control system.

#### SD-03 Product Data

##### Service Organizations; G, AE

Six (6) copies of a list of service organizations qualified to service the HVAC control system. The list shall include the service organization name, address, technical point of contact and telephone number, and contractual point of contact and telephone number.

##### Equipment Compliance Booklet; G, AE

The HVAC Control System Equipment Compliance Booklet (ECB) shall be in booklet form and indexed, with numbered tabs separating the information on each device. It shall consist of, but not be limited to, data sheets and catalog cuts which document compliance of all devices and components with the specifications. The ECB shall be indexed in alphabetical order by the unique identifiers. Devices and components which do not have unique identifiers shall follow the devices and components with unique identifiers and shall be indexed in alphabetical order according to their functional name. The ECB shall include a Bill of Materials for each HVAC Control System. The Bill of Materials shall function as the Table of Contents for the ECB and shall include the device's unique identifier, device function, manufacturer, model/part/catalog number used for ordering, and tab number where the device information is located in the ECB. The ECB shall be submitted along with Submittal SD-04, Drawings.

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##### Commissioning Procedures; G, AE

Six (6) copies of the HVAC control system commissioning procedures, in booklet form and indexed, 60 days prior to the scheduled start of commissioning. Commissioning procedures shall be provided for each HVAC control system, and for each type of

terminal unit control system. The Commissioning procedures shall reflect the format and language of this specification, and refer to devices by their unique identifiers as shown. The Commissioning procedures shall be specific for each HVAC system, and shall give detailed step-by-step procedures for commissioning of the system.

a. The Commissioning procedures shall include detailed, product specific set-up procedures, configuration procedures, adjustment procedures, and calibration procedures for each device. Where the detailed product specific commissioning procedures are included in manufacturer supplied manuals, reference may be made in the HVAC control system commissioning procedures to the manuals.

b. An HVAC control system commissioning procedures equipment list shall be included that lists the equipment to be used to accomplish commissioning. The list shall include manufacturer name, model number, equipment function, the date of the latest calibration, and the results of the latest calibration.

Performance Verification Test Procedures; G, AE

Six (6) copies of the HVAC Control System Performance Verification Test Procedures, in booklet form and indexed, 60 days before the Contractor's scheduled test dates. The performance verification test procedures shall refer to the devices by their unique identifiers as shown, shall explain, step-by-step, the actions and expected results that will demonstrate that the HVAC control system performs in accordance with the sequences of operation, and other contract documents. An HVAC control system performance verification test equipment list shall be included that lists the equipment to be used during performance verification testing. The list shall include manufacturer name, model number, equipment function, the date of the latest calibration, and the results of the latest calibration.

Training; G, RE

An outline for the HVAC control system training course with a proposed time schedule. Approval of the planned training schedule shall be obtained from the Government at least 60 days prior to the start of the training. Six (6) copies of HVAC control system training course material 30 days prior to the scheduled start of the training course. The training course material shall include the operation manual, maintenance and repair manual, and paper copies of overheads used in the course.

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SD-06 Test Reports

Commissioning Report; G, AE

Six (6) copies of the HVAC Control System Commissioning Report, in booklet form and indexed, within 30 days after completion of the system commissioning. The commissioning report shall include data collected during the HVAC control system commissioning procedures and shall follow the format of the commissioning procedures. The commissioning report shall include all configuration checksheets with final values listed for all parameters, setpoints, P, I, D setting constants, calibration data for all devices, results of adjustments, and results of testing.

Performance Verification Test; G, AE

Six (6) copies of the HVAC Control System Performance

Verification Test Report, in booklet form and indexed, within 30 days after completion of the test. The HVAC control system

performance verification test report shall include data collected during the HVAC control system performance verification test. The original copies of all data gathered during the performance verification test shall be turned over to the Government after Government approval of the test results.

SD-10 Operation and Maintenance Data

Operation Manual; G, RE

Maintenance and Repair Manual; G, RE

Six (6) copies of the [HVAC Control System Operation Manual] [and] [HVAC Control System Maintenance and Repair Manual, for each HVAC control system, 30 days before the date scheduled for the training course.

#### 1.4 DELIVERY AND STORAGE

Products shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, and other contaminants, within the storage condition limits published by the equipment manufacturer. Dampers shall be stored so that seal integrity, blade alignment and frame alignment are maintained.

#### 1.5 OPERATION MANUAL

An HVAC control system operation manual in indexed booklet form shall be provided for each HVAC control system. The operation manual shall include the HVAC control system sequence of operation, and procedures for the HVAC system start-up, operation and shut-down. The operation manual shall include as-built HVAC control system detail drawings. The operation manual shall include the as-built configuration checksheets, the procedures for changing HVAC control system setpoints, and the procedures for placing HVAC system controllers in the manual control mode.

a. The procedures for changing HVAC control system setpoints shall describe the step-by-step procedures required to change the process variable

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setpoints, the alarm setpoints, the bias settings, and setpoint reset schedules.

b. The procedures for placing HVAC system controllers in the manual control mode shall describe step-by-step procedures required to obtain manual control of each controlled device and to manually adjust their positions.

#### 1.6 MAINTENANCE AND REPAIR MANUAL

An HVAC control system maintenance and repair manual in indexed booklet form in hardback binders shall be provided for each HVAC control system. The maintenance and repair manual shall include the routine maintenance checklist, a recommended repair methods list, a list of recommended maintenance and repair tools, the qualified service organization list, the as-built commissioning procedures and report, the as-built performance verification test procedures and report, and the as-built equipment data booklet.

a. The routine maintenance checklist shall be arranged in a columnar format. The first column shall list all devices listed in the equipment compliance booklet, the second column shall state the maintenance activity or state no maintenance required, the third column shall state the frequency of the maintenance activity, and the fourth column for additional comments or reference.

b. The recommended repair methods list shall be arranged in a columnar format and shall list all devices in the equipment data compliance booklet and state the guidance on recommended repair methods, either field repair, factory repair, or whole-item replacement.

c. The as-built equipment data booklet shall include the equipment compliance booklet and manufacturer supplied user manuals and information.

d. If the operation manual and the maintenance and repair manual are provided in a common volume, they shall be clearly differentiated and separately indexed.

#### 1.7 MAINTENANCE AND SERVICE

Services, materials and equipment shall be provided as necessary to maintain the entire system in an operational state as specified for a period of one year after successful completion and acceptance of the Performance Verification Test. Impacts on facility operations shall be minimized.

##### 1.7.1 Description of Work

The adjustment and repair of the system shall include the manufacturer's required adjustments of computer equipment, software updates, transmission equipment and instrumentation and control devices.

##### 1.7.2 Personnel

Service personnel shall be qualified to accomplish work promptly and satisfactorily. The Government shall be advised in writing of the name of the designated service representative, and of any changes in personnel.

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##### 1.7.3 Scheduled Inspections

Two inspections shall be performed at six-month intervals (or less if required by the manufacturer), and all work required shall be performed. Inspections shall be scheduled in June and December. These inspections shall include:

- a. Visual checks and operational tests of equipment.
- b. Fan checks and filter changes for control system equipment.
- c. Clean control system equipment including interior and exterior surfaces.
- d. Check and calibrate each field device. Check and calibrate 50 percent of the total analog points during the first inspection. Check and calibrate the remaining 50 percent of the analog points during the second major inspection. Certify analog test instrumentation accuracy to be twice that of the device being calibrated. Randomly check at least 25 percent of all digital points for proper operation during the first inspection. Randomly check at least 25 percent of the remaining digital points during the second inspection.
- e. Run system software diagnostics and correct diagnosed problems.
- f. Resolve any previous outstanding problems.

##### 1.7.4 Scheduled Work

This work shall be performed during regular working hours, Monday through Friday, excluding legal holidays.

##### 1.7.5 Emergency Service

The Government will initiate service calls when the system is not functioning properly. Qualified personnel shall be available to provide service to the system. A telephone number where the service supervisor can be reached at all times shall be provided. Service personnel shall be at the site within 24 hours after receiving a request for service. The control system shall be restored to proper operating condition within three calendar days after receiving a request for service.

##### 1.7.6 Operation

Scheduled adjustments and repairs shall include verification of the control system operation as demonstrated by the applicable tests of the performance verification test.

##### 1.7.7 Records and Logs

Dated records and logs shall be kept of each task, with cumulative records



for each major component, and for the complete system chronologically. A continuous log shall be maintained for all devices. The log shall contain initial analog span and zero calibration values and digital points. Complete logs shall be kept and shall be available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the control system.

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#### 1.7.8 Work Requests

Each service call request shall be recorded as received and shall include the serial number identifying the component involved, its location, date and time the call was received, nature of trouble, names of the service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the materials to be used, the time and date work started, and the time and date of completion. A record of the work performed shall be submitted within 5 days after work is accomplished.

#### 1.7.9 System Modifications

Recommendations for system modification shall be submitted in writing. No system modifications, including operating parameters and control settings, shall be made without prior approval of the Government. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected.

#### 1.7.10 Software

Updates to the software shall be provided for system, operating and application software, and operation in the system shall be verified. Updates shall be incorporated into operations and maintenance manuals, and software documentation. There shall be at least one scheduled update near the end of the first year's warranty period, at which time the latest released version of the Contractor's software shall be installed and validated.

### PART 2 PRODUCTS

#### 2.1 GENERAL EQUIPMENT REQUIREMENTS

Units of the same type of equipment shall be products of a single manufacturer. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of a similar material, design and workmanship. The standard products shall have been in a satisfactory commercial or industrial use for two years prior to use on this project. The two years' use shall include applications of equipment and materials under similar circumstances and of similar size. The two years' experience shall be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation, for not less than 6,000 hours exclusive of the manufacturer's factory tests, can be shown. The equipment items shall be supported by a service organization. Items of the same type and purpose shall be identical, including equipment, assemblies, parts and components. Automatic temperature controls shall be direct digital controls, manufactured by Williams Electric Company, Inc., that will provide the required sequence of operation.

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##### 2.1.1 Electrical and Electronic Devices

Electrical, electronic, and electropneumatic devices not located within a DDC panel shall have a NEMA ICS 1 enclosure in accordance with NEMA 250

unless otherwise shown.

#### 2.1.2 Standard Signals

Except for air distribution terminal unit control equipment, the output of all analog transmitters and the analog input and output of all DDC controllers shall be 4-to-20 mA<sub>dc</sub> signals. The signal shall originate from current-sourcing devices and shall be received by current-sinking devices.

#### 2.1.3 Ambient Temperature Limits

DDC panels shall have ambient condition ratings of 35 to 120 degrees F and 10 to 95 percent relative humidity, noncondensing. Devices installed outdoors shall operate within limit ratings of minus 35 to plus 150 degrees F. Instrumentation and control elements shall be rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installed location.

#### 2.1.4 Year 2000 Compliance

All equipment and software shall be Year 2000 compliant and shall be able to accurately process date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, including leap year calculations, when used in accordance with the product documentation provided by the contractor, provided that all products (e.g. hardware, software, firmware) used in combination with other information technology, shall accurately process date/time data if other information technology properly exchanges date/time data with it.

### 2.2 NOT USED

## 2.3 WIRING

#### 2.3.1 Terminal Blocks

Terminal blocks shall be insulated, modular, feed-through, clamp style with recessed captive screw-type clamping mechanism, shall be suitable for rail mounting, and shall have end plates and partition plates for separation or shall have enclosed sides.

#### 2.3.2 Control Wiring for 24-Volt Circuits

Control wiring for 24-volt circuits shall be 18 AWG minimum, stranded copper and shall be rated for 300-volt service.

#### 2.3.3 Wiring for 120-Volt Circuits

Wiring for 120-volt circuits shall be 18 AWG minimum, stranded copper and shall be rated for 600-volt service.

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#### 2.3.4 Instrumentation Cable

Instrumentation cable shall be 18 AWG, stranded copper, single- or multipl-twisted, minimum 2 inch lay of twist, 100 percent shielded pairs, and shall have a 300-volt insulation. Each pair shall have a 20 AWG tinned-copper drain wire and individual overall pair insulation. Cables shall have an overall aluminum-polyester or tinned-copper cable-shield tape, overall 20 AWG tinned-copper cable drain wire, and overall cable insulation.

#### 2.3.5 Transformers

Step down transformers shall be utilized where control equipment operates at lower than line circuit voltage. Transformers, other than transformers in bridge circuits, shall have primaries wound for the voltage available and secondaries wound for the correct control circuit voltage. Transformer shall be sized so that the connected load is 80 percent of the rated capacity or less. Transformers shall conform to UL 508 and NEMA ST 1.

## 2.4 ACTUATORS

Actuators shall be electric or electronic as shown and shall be provided

with mounting and connecting hardware. Electric or electronic actuators shall be used for variable air volume (VAV) air terminal units. Actuators shall fail to their spring-return positions on signal or power failure ,except that VAV terminal unit actuators may be of the floating type. The actuator stroke shall be limited in the direction of power stroke by an adjustable stop. Actuators shall have a visible position indicator. Actuators shall smoothly open or close the devices to which they are applied and shall have a full stroke response time of 90 seconds or less. Electric actuators shall have an oil-immersed gear train. Electric or electronic actuators operating in series shall have an auxiliary actuator driver. Electric or electronic actuators used in sequencing applications shall have an adjustable operating range and start point

#### 2.4.1 Valve Actuators

Valve actuators shall be selected to provide a minimum of 125 percent of the motive power necessary to operate the valve over its full range of operation.

#### 2.5 AUTOMATIC CONTROL VALVES - REFER ALSO TO SECTION 15556 - FORCE HOT WATER HEATING SYSTEMS USING WATER AND STEAM HEAT EXCHANGERS

Valves shall have stainless-steel stems and stuffing boxes with extended necks to clear the piping insulation. Unless otherwise stated, valves shall have globe style bodies. Valve bodies shall be designed for not less than 125 psig working pressure or 150 percent of the system operating pressure, whichever is greater. Valve leakage rating shall be 0.01 percent of rated Cv. Unless otherwise specified, bodies for valves 1-1/2 inches and smaller shall be brass or bronze, with threaded or union ends; bodies for 2 inch valves shall have threaded ends; and bodies for valves 2 to 3 inches shall be of brass, bronze or iron. Bodies for valves 2-1/2 inches and larger shall be provided with flanged-end connections. Valve Cv shall be within 100 to 125 percent of the Cv shown.

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#### 2.5.1 Butterfly Valve Assembly

Butterfly valves shall be threaded lug type suitable for dead-end service and modulation to the fully-closed position, with carbon-steel bodies and noncorrosive discs, stainless steel shafts supported by bearings, and EPDM seats suitable for temperatures from minus 20 to plus 250 degrees F. Valves shall have a manual means of operation independent of the actuator. The rated Cv for butterfly valves shall be the value Cv at 70% open (60 degrees open).

#### 2.5.2 Two-Way Valves

Two-way modulating valves shall have equal-percentage characteristics.

#### 2.5.3 Three-Way Valves

Three-way valves shall provide linear flow control with constant total flow throughout full plug travel.

#### 2.5.4 Duct-Coil and Terminal-Unit-Coil Valves

Control valves shall be industrial quality ball type with bronze body, stainless steel ball and stem, two or three port as indicated, Teflon seats, and threaded ends. Body rating of 125 psi at 250°F. Unless otherwise noted, valves shall be sized for 3 psi pressure drop at design flow rate and shall close off against shut-off head. Two way valves shall be equal percent, three way valves shall be linear. Acceptable manufacturers shall be Delta Controls, Johnson Controls, or Honeywell.

#### 2.5.5 Valves for Chilled-Water, Condenser-Water, and Glycol Service

Internal valve trim shall be bronze except that valve stems may be type 316 stainless steel. Valve Cv shall be within 100 to 125 percent of the Cv shown. Valves 4 inches and larger shall be butterfly.

#### 2.5.6 Valves for Hot-Water and Dual Temperature Service

For hot water service below 250 degrees F and dual-temperature service, internal trim (including seats, seat rings, modulating plugs, and springs) of valves controlling water hotter than 210 degrees F shall be Type 316 stainless steel. Internal trim for valves controlling water 210 degrees F or less shall be brass or bronze. Nonmetallic parts of hot-water control valves shall be suitable for a minimum continuous operating temperature of 250 degrees F or 50 degrees F above the system design temperature, whichever is higher. Valves 4 inches and larger shall be butterfly valves.

#### 2.5.7 Valves for Steam Service

Bodies for valves 4 inches and larger shall be iron. Internal valve trim shall be Type 316 stainless steel. Valve Cv shall be not less than shown nor greater than the Cv of the manufacturer's next larger size.

#### 2.6 NOT USED

#### 2.7 NOT USED

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### 2.8 INSTRUMENTATION

#### 2.8.1 Measurements

Transmitters shall be calibrated to provide the following measurements, over the indicated ranges, for an output of 4 to 20 mAdc:

- a. Conditioned space temperature, from 50 to 85 degrees F.
- b. Duct temperature, from 40 to 140 degrees F.
- c. Not Used.
- d. Chilled-water temperature, from 30 to 100 degrees F.
- e. Dual-temperature water, from 30 to 240 degrees F.
- f. Heating hot-water temperature, from 50 to 250 degrees F.
- g. Not Used.
- h. Outside-air temperature, from minus 30 to 130 degrees F.
- i. Relative humidity, 0 to 100 percent for space and duct high-limit applications.
- j. Differential pressure for VAV supply-duct static pressure from 0 to 2.0 inches water gauge.
- k. Pitot-tube air-flow measurement station and transmitter, from 0 to 0.1 inch water gauge for flow velocities of 700 to 1200 fpm, 0 to 0.25 inch water gauge for velocities of 700 to 1800 fpm, or 0 to 0.5 inch water gauge for velocities of 700 to 2500 fpm.
- l. Electronic air-flow measurement station and transmitter, from 125 to 2500 fpm.

#### 2.8.2 Temperature Instruments

##### 2.8.2.1 Resistance Temperature Detectors (RTD)

Temperature sensors shall be 1000 ohms 2- or 3-wire RTD. Each RTD shall be platinum with a tolerance of 0.1 degrees F at 32 degrees F and shall be encapsulated in epoxy, series 300 stainless steel, anodized aluminum, or copper. Each RTD shall be furnished with an RTD transmitter as specified, integrally mounted unless otherwise shown.

##### 2.8.2.2 Continuous Averaging RTD

Continuous averaging RTDs shall have a tolerance of plus or minus 1.0 degree F at the reference temperature, and shall be of sufficient length to ensure that the resistance represents an average over the cross section in which it is installed. The sensing element shall have a bendable copper sheath. Each averaging RTD shall be furnished with an RTD transmitter to match the resistance range of the averaging RTD.

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##### 2.8.2.3 RTD Transmitter

The RTD transmitter shall match the resistance range of the RTD. The

transmitter shall be a two-wire, loop powered device. The transmitter shall produce a linear 4-to-20 mA<sub>dc</sub> output corresponding to the required temperature measurement. The output error shall not exceed 0.1 percent of the calibrated measurement.

#### 2.8.3 Relative Humidity Instruments

A relative-humidity instrument for indoor application shall have a measurement range from 0 to 100 percent relative-humidity and be rated for operation at ambient air temperatures within the range of 25 to 130 degrees F. It shall be capable of being exposed to a condensing air stream (100 percent RH) with no adverse effect to the sensor's calibration or other harm to the instrument. The instrument shall be of the wall-mounted or ductmounted type, as required by the application, and shall be provided with any required accessories. Instruments used in duct high-limit applications shall have a bulk polymer resistive sensing element. Duct-mounted instruments shall be provided with a duct probe designed to protect the sensing element from dust accumulation and mechanical damage. The instrument (sensing element and transmitter) shall be a two-wire, looppowered device and shall have an accuracy of plus or minus three percent of full scale within the range of 20 to 80 percent relative humidity. The instrument shall have a typical long-term stability of 1 percent or less drift per year. The transmitter shall convert the sensing element's output to a linear 4-20 mA<sub>dc</sub> output signal in proportion to the measured relativehumidity

value. The transmitter shall include offset and span adjustments.

#### 2.8.6 Differential Pressure Instruments

The instrument shall be a pressure transmitter with an integral sensing element. The instrument over pressure rating shall be 300 percent of the operating pressure. The sensor/transmitter assembly accuracy shall be plus or minus two percent of full scale. The transmitter shall be a two-wire, loop-powered device. The transmitter shall produce a linear 4-to-20 mA<sub>dc</sub> output corresponding to the required pressure measurement.

#### 2.8.7 Thermowells

Thermowells shall be Series 300 stainless steel with threaded brass plug and chain, 2 inch lagging neck and extension type well. Inside diameter and insertion length shall be as required for the application.

#### 2.8.8 Sunshields

Sunshields for outside air temperature sensing elements shall prevent the sun from directly striking the temperature sensing elements. The sunshields shall be provided with adequate ventilation so that the sensing element responds to the ambient temperature of the surroundings. The top of each sunshield shall have a galvanized metal rainshield projecting over the face of the sunshield. The sunshields shall be painted white.

### 2.9 THERMOSTATS

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Thermostat ranges shall be selected so that the setpoint is adjustable without tools between plus or minus 10 degrees F of the setpoint shown. Thermostats shall be electronic or electric.

#### 2.9.1 Nonmodulating Room Thermostats

Contacts shall be single-pole double-throw (SPDT), hermetically sealed, and wired to identified terminals. Maximum differential shall be 5 degrees F. Room thermostats shall be enclosed with separate locking covers (guards).

#### 2.9.2 Microprocessor Based Room Thermostats

Microprocessor based thermostats shall have built-in keypads for scheduling of day and night temperature settings. When out of the scheduling mode, thermostats shall have continuous display of time, with AM and PM indicator,

continuous display of day of week, and either continuous display of room temperature with display of temperature setpoint on demand, or continuous display of temperature setpoint with display of room temperature on demand. In the programmable mode, the display shall be used for interrogating time program ON-OFF setpoints for all seven days of the week. The time program shall allow two separate temperature setback intervals per day. The thermostats shall have a means for temporary and manual override of the program schedule, with automatic program restoration on the following day. Thermostats shall have a replaceable battery to maintain the timing and maintain the schedule in memory for one year in the event of a power outage. Maximum differential shall be 2 degrees F. When used for heat pump applications, the thermostat shall have an emergency heat switch.

#### 2.9.3 Modulating Room Thermostats

Modulating room thermostats shall have either one output signal, two output signals operating in unison, or two output signals operating in sequence, as required for the application. Each thermostat shall have an adjustable throttling range of 4 to 8 degrees F for each output. Room thermostats shall be enclosed with separate locking covers (guards).

#### 2.9.4 Nonmodulating Capillary Thermostats and Aquastats

Each thermostat shall have a capillary length of at least 5 feet, shall have adjustable direct-reading scales for both setpoint and differential, and shall have a differential adjustable from 6 to 16 degrees F. Aquastats shall be of the strap on type, with 10 degrees F fixed differential.

#### 2.9.5 Freezestats

Freezestats shall be manual reset, low temperature safety thermostats, with NO and NC contacts and a 20 foot element which shall respond to the coldest 18 inch segment. Freezestats shall be field adjustable.

#### 2.9.6 Modulating Capillary Thermostats

Each thermostat shall have either one output signal, two output signals operating in unison, or two output signals operating in sequence, as required for the application. Thermostats shall have adjustable throttling ranges of 4 to 8 degrees F for each output.

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#### 2.9.7 Not Used

### 2.10 PRESSURE SWITCHES AND SOLENOID VALVES

#### 2.10.1 Pressure Switches

Each switch shall have an adjustable setpoint with visible setpoint scale. Range shall be as shown. Differential adjustment shall span 20 to 40 percent of the range of the device.

#### 2.10.2 Differential-Pressure Switches

Each switch shall be an adjustable diaphragm-operated device with two SPDT contacts, with taps for sensing lines to be connected to duct pressure fittings designed to sense air pressure. These fittings shall be of the angled-tip type with tips pointing into the air stream. The setpoint shall not be in the upper or lower quarters of the range and the range shall not be more than three times the setpoint. Differential shall be a maximum of 0.15 inch water gauge at the low end of the range and 0.35 inch water gauge at the high end of the range.

#### 2.11 NOT USED

### 2.12 CONTROL DEVICES AND ACCESSORIES

#### 2.12.1 Relays

Control relay contacts shall have utilization category and ratings selected for the application, with a minimum of two sets of contacts (two normally open, two normally closed) enclosed in a dustproof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall

be 20 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to 150 percent of rated coil voltage. Time delay relays shall be 2PDT with eight-pin connectors, dust cover, and a matching rail-mounted socket. Adjustable timing range shall be 0 to 5 minutes. Power consumption shall not be greater than three watts.

#### 2.12.2 Not Used

#### 2.12.3 Joule or Watthour Meters

Watthour meters shall be in accordance with ANSI C12.1 and have pulse initiators for remote monitoring of Watthour consumption. Pulse initiator shall consist of form C contacts with a current rating not to exceed two amperes and voltage not to exceed 500 V, with combinations of VA not to exceed 100 VA, and a life rating of one billion operations. Meter sockets shall be in accordance with ANSI C12.1.

#### 2.12.4 Joule or Watthour Meters with Demand Register

Meters shall be in accordance with ANSI C12.1 and shall have pulse initiators for remote monitoring of Watthour consumption and instantaneous demand. Pulse initiators shall consist of form C contacts with a current rating not to exceed two amperes and voltage not to exceed 500 V, with combinations of VA not to exceed 100 VA, and a life rating of one billion operations. Meter sockets shall be in accordance with ANSI C12.1

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#### 2.12.5 Joule or Watthour Transducers

Watthour transducers shall have an accuracy of plus or minus 0.25 percent for kW and kWh outputs from full lag to full lead power factor. Input ranges for kW and kWh transducers shall be selectable without requiring the changing of current or potential transformers. The output shall be 4 to 20 mAdc.

#### 2.12.6 Current Sensing Relays

Current sensing relays shall provide a normally-open contact rated at a minimum of 50 volts peak and 1/2 ampere or 25 VA, noninductive. There shall be a single hole for passage of current carrying conductors. The devices shall be sized for operation at 50 percent rated current based on the connected load. Voltage isolation shall be a minimum of 600 volts.

#### 2.12.7 Power-Line Conditioners (PLC)

Power line conditioners shall be furnished for each DDC panel. The PLCs shall provide both voltage regulation and noise rejection. The PLCs shall be of the ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power-line side. The PLCs shall be sized for 125 percent of the actual connected kVA load. Characteristics of the PLC shall be as follows:

- a. At 85 percent load, the output voltage shall not deviate by more than plus or minus one percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.
- b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus three percent of nominal voltage. Full correction of load switching disturbances shall be accomplished within five cycles, and 95 percent correction shall be accomplished within two cycles of the onset of the disturbance.
- c. Total harmonic distortion shall not exceed 3-1/2 percent at full load.

#### 2.13 NOT USED

#### 2.14 DIRECT DIGITAL CONTROL (DDC) HARDWARE

All functions, constraints, data base parameters, operator developed programs and any other data shall be downloadable from a portable workstation/tester or the central workstation/tester (WEC USC 3000 Utility

Control system (COS)) to RTU's and ACU's. Download shall be accomplished through both the primary network and the local DDC portable workstation/tester port.

#### 2.14.1 RCU (Remote Control Unit)

Remote control unit shall be WEC Model 3218 RCU:

Processor: MOTOROLA 68000, 10 MHZ

MEMORY: 1 MB RAM, 256 KB FLASH.

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Digital Inputs: Quantity of 8. 5 to 24 AC or DC, jumper select 24 VAC power for dry contacts. LED indicators for each input.

Digital Outputs: Quantity of 8. relays with 24 VAC 2 AMP contacts, with HOA switches jumper select common to 24 VAC constant for watchdog power LED indicators for each output. Hand-Off-Auto switches for each output.

Analog Inputs: Quantity of 16 4-20 mA.

Analog Outputs: Quantity of 8. 4-20 mA, with HOA switches and manual adjustment. Manual-Off-Auto switches for each output.

Pulse Accumulators: Quantity of 4. 5 to 24 volt AC or DC jumper select 24 VAC power for dry contacts.

Communications: HOST: RS232/ACU: RS232/UCU: RS485/Diagnostics: RS232.

Memory Backup: 168 HOURS USING SUPER CAPACITORS

##### 2.14.1.1 Integral Features

The RCU shall include:

- a. Main power switch
- b. Power on indicator
- c. Portable workstation/tester port, connector and if necessary power supply
- d. Manufacturers control network port
- e. Hand-Off-Auto switches for each DO which controls a device. These switches shall be mounted in the RCU, with the exception of motors, for which the switch shall be mounted at the motor control center. On-Off-Auto switches are not required for DO associated with a status or alarm such as pilot lights. The status of these switches shall be available to the RCU for further processing.
- f. Manual-Off-Auto switches for each AO. The status of these shall be available to the panel for further processing.

#### 2.14.2 ACU (Auxiliary Control Unit)

Auxiliary Control Unit shall be WEC Model 3318 ACU:

Processor: MOTOROLA 68000, 10 MHZ

MEMORY: 1 MB RAM, 256 KB FLASH.

Digital Inputs: Quantity of 8. 5 to 24 AC or DC, jumper select 24 VAC power for dry contacts. LED indicators for each input.

Digital Outputs: Quantity of 8. relays with 24 VAC 2 AMP contacts, with HOA switches jumper select common to 24 VAC constant for watchdog power LED indicators for each output. Hand-Off-Auto switches for each output.

Analog Inputs: Quantity of 16 4-20 mA.

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Analog Outputs: Quantity of 8. 4-20 mA, with HOA switches and manual adjustment. Manual-Off-Auto switches for each output.

Pulse Accumulators: Quantity of 4. 5 to 24 volt AC or DC jumper select 24 VAC power for dry contacts.

Communications: HOST: RS232/ACU: RS232/UCU: RS485/Diagnostics: RS232

##### 2.14.2.1 Integral Features

The ACU shall include:

- a. Main power switch
- b. Power on indicator



- c. Portable workstation/tester port, connector and if necessary power supply
- d. Manufacturers control network port
- e. Hand-Off-Auto switches for each DO which controls a device. These switches shall be mounted in the RCU, with the exception of motors, for which the switch shall be mounted at the motor control center. On-Off-Auto switches are not required for DO associated with a status or alarm such as pilot lights. The status of these switches shall be available to the RCU for further processing.
- f. Manual-Off-Auto switches for each AO. The status of these shall be available to the panel for further processing.

2.14.3 Not Used

2.14.4 Not Used

2.14.5 Not Used

2.14.6 Not Used

2.14.7 Not Used

2.14.8 Portable Workstation/Tester

A portable workstation/tester shall be provided and shall be able to connect to any DDC hardware. The portable workstation/tester shall consist of a portable computer with a nominal 10 inch active color matrix liquid crystal display, capable of displaying up to 256 colors at a minimum resolution of 640 X 480 pixels, an external VGA monitor port, 32 bit microprocessor operating at a minimum of 100 MHZ. The portable workstation/tester shall have, as a minimum, a 20 GB hard drive, 256 megabytes of memory, integral pointing device touch pad type, serial and parallel ports, color VGA video port for an external color monitor, 3.5 inch floppy disk drive, 8X speed CD drive, modem, PCMCIA type 3 slot, rechargeable battery, battery charger and 120 Vac power supply. It shall include carrying case, extra battery, charger and a compatible network adapter. The workstation/tester shall:

- a. Run DDC diagnostics.

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- b. Load all DDC memory resident programs and information, including parameters and constraints.
- c. Display any AI, DI, AO, DO, or PA point in engineering units for analog points or status for digital points.
- d. Control any AO or DO.
- e. Provide an operator interface, contingent on password level, allowing the operator to use full English language words and acronyms, or an object oriented graphical user interface.
- f. Display database parameters.
- g. Modify database parameters.
- h. Accept DDC software and information for subsequent loading into a specific DDC. Provide all necessary software and hardware required to support this function, including an EIA ANSI/EIA/TIA 232-F port.
- i. Disable/enable each DDC.
- j. Perform all workstation functions as specified.

2.14.9 Not Used

2.14.10 Not Used

2.15 DDC SOFTWARE

ACUs interface directly to the DE and perform some of the RCU functions. ACU software shall be held entirely in EPROM. There shall be one ACU program for all ACUs and it determines its I/O configuration at start-up. The ACU software shall scan all input points and reports only changes to the RCU when polled. ACU software shall also respond to RCU requests to read and transmit all point values. The analog input points shall be averaged in

the ACU before transmission to the RCU. Output points shall be set by commands from the RCU.

A RCU shall poll all ACUs under its control. RCUs shall receive only the changes since the last poll. These changes shall be stored in the RCU data base and shall be also transmitted to the COS. The RCU checks it's RCU resident constraints before issuing an output command to the ACU. The RCU shall have a hardware clock that is corrected at least daily from the COS. The time correction shall be performed at least once per day and after each communication failure or power interruption.

#### 2.15.1 Operating System

The RCU Multitasking Operating System (FIDMOS) was written by Williams Electric Company, Inc. to control and schedule all RCU tasks. FIDMOS is an interrupt driven operating system which provides inter-task communication through message packets. FIDMOS can handle 255 tasks, 256 priority levels, and 32 event flags. It also provides various timer facilities to the tasks running in the RCUs. The task scheduling algorithm is round-robin for tasks of equal priority.

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FIDMOS maintains the current time of day which is synchronized with the COS periodically to within plus/minus 1 second. The time synchronization is performed automatically by the COS without operator intervention and without shutting down the system. Time is maintained as year, month, date, day of week, hours, minutes and seconds.

The application tasks that execute under FIDMOS shall maintain the RCU unit and point data base entirely in RCU RAM.

The RCU flash memory firmware shall allow downloading of software and data from the COS or the Portable Diagnostic Test Unit (PDTU).

##### 2.15.1.1 (CU) Control Unit Startup

When a CU is powered on, manually or automatically after a power failure, the CU startup routine shall read the state of the option switches, determine the status of RAM (retained or not retained), and wait for a message from the COS. If no message is received and RAM has been retained, the RCU shall continue operation in stand-alone mode. If RAM has not been maintained, the RCU shall not poll it's ACUs, thus keeping the DE failure mode in effect. The RCU shall not operate at all if a low battery condition exists and therefore does not enter communication mode or stand-alone mode. In this condition, the RCU does nothing and its ACUs revert to their failure modes.

##### 2.15.1.2 (CU) Operating Mode

CUs shall perform all specified control and monitoring functions independent of COS communications. Functions and applications shall be performed on data base parameters, current DE data, and the real time clock. The real time clock shall be updated from the COS at least once a day. The clocks shall be stable enough to maintain time within two seconds over a 24-hour period. All DE commands shall be subjected to constraint checking. Complete status including point values, and alarms shall be transmitted to the COS when the communications circuits are operational. While in stand-alone mode, any information normally transmitted to the COS shall be stored for later transmission when communications is re-established. Constraints shall reside in the CU.

##### 2.15.1.3 Failure Mode

Upon failure (and CU is unable to continue stand-alone operation) for any reason, each CU shall perform an orderly shutdown and force all CU outputs to a predetermined (failure mode) state, consistent with the failure modes shown and the associated control device.

#### 2.15.2 Functions

The Contractor shall provide software necessary to accomplish the following functions, as appropriate, fully implemented and operational, within each RCU and ACU.

- a. Scanning of inputs.
- b. Control of outputs.
- c. Reporting of analog changes outside a selectable differential.
- d. Reporting of unauthorized digital status.
- e. Reporting of alarms automatically to the COS.
- f. Reporting of I/O status to COS at least once a day.
- g. Maintain time of day, updated by the COS at least once a day.
- h. Communication with the CU.
- i. Execution of CU resident application programs.
- j. Averaging or filtering of AIs.
- k. Constraints checks (prior to command issuance).
- l. CU Diagnostics.
- m. CU portable workstation/tester operation.
- n. Reset of PA by operator based on time and value.

#### 2.15.2.1 Analog Monitoring

The system shall measure and transmit analog values including calculated analog points. Analog values are reported after loss of communications, or when value changes by a preset differential value. The system shall allow each point to have a unique engineering unit conversion.

#### 2.15.2.2 Logic (Virtual) Points

Logic (virtual) points shall be software points entered in the point database which are not directly associated with a physical I/O function. Logic (virtual) points shall be analog or digital points created by calculation from any combination of digital and analog points, or other data having the properties of real points, including alarms, without the associated hardware. Logic (virtual) points shall be defined or calculated and entered into the database by the Contractor. The calculated analog point shall have point identification in the same format as any other analog point. The calculated point shall be used in any program where the real value is not obtainable directly. Constants used in calculations shall be changeable on-line by the operator.

Virtual points include:

- a. Control loop setpoints
- b. Control loop gain constraints
- c. Control loop integral constraints
- d. Summer/Winter operation
- e. Real time
- f. Scheduled on/off times
- g. Equipment run time targets
- h. Calculated point values
- i. Heating/Cooling mode operation authorization
- j. Economizer mode operation authorization

#### 2.15.3 I/O Point Database/Parameter Definition

Each I/O point shall be defined in a database residing in the CU and COS. The definition shall include all required physical parameters associated and the required COS data base subset shall be automatically extracted for downloading to any CU.

#### 2.15.4 Alarm Processing

Each CU shall have alarm processing software for AI, DI, and PA alarms for all real and virtual points connected to that CU.

#### 2.15.4.1 Digital Alarms Definition

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Digital alarms are those abnormal conditions indicated by DIs as specified and shown.

#### 2.15.4.2 Analog Alarms Definition

Analog points are compared to pre-defined high and low limits. Excursions outside of these limits shall be flagged as alarms and reported to the COS. Points shall return to normal by a predefined differential value prior to being declared to be out of alarm a second time. All high limits, low limits and differentials shall be uniquely defined for each point. These values can be altered on-line without interrupting the monitoring of any point.

#### 2.15.4.3 Pulse Accumulator Alarms Definition

Shall be processed identically to analog alarms described in the preceding paragraph.

#### 2.15.5 Constraints

##### 2.15.5.1 Equipment Constraints Definitions

Constraints are entered for each control point in the CU data base including as applicable:

- a. Maximum starts (cycles) per hour.
- b. Minimum off time.
- c. Minimum on time.
- d. High limit (in engineering units).
- e. Low limit (in engineering units).

##### 2.15.5.2 CU Constraints Diagnostics

Control devices connected to the system shall have the CU memory resident constraints checked before each command is issued to insure that no equipment damage will result from improper operation. Each command shall be executed by the CU only after all constraints checks have been passed. Each command point shall have unique constraints assigned. High and low "reasonableness" values or one differential "rate-of-change" value shall be assigned to each AI. Values outside the reasonableness limits shall be rejected and an alarm message sent to the network control panel or portable workstation/tester. Status changes and analog point values shall be reported to the workstation upon operator request, such as for reports, alphanumeric displays, graphic displays, and application programs. Each individual point shall be capable of being selectively disabled by the operator from a workstation/tester. Disabling a point shall prohibit monitoring and automatic control of that point.

#### 2.15.6 CU Diagnostics

Each CU shall have self-test diagnostic implemented in false memory. The tests shall include test of memory. Additional diagnostic software shall be included with portable workstation/tester. The software shall display messages in English to inform the tester's operator of diagnosed problems.

#### 2.15.7 Summer-Winter Operation Monitoring

See Scheduled start/stop program

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#### 2.15.8 Control Sequences and Control Loops

Operator commands shall be provided to create, modify, and execute control loops as specified. The data entry process shall be prompt for operator input wherever necessary. All modifications require operator confirmation before the changes are put into effect. All mathematical functions required to implement the sequences and loop shall be available. RCUs shall have sufficient capacity to handle at least four additional control sequences and control loops beyond the number implemented at installation time. Control sequences can accommodate many more than 8 terms or devices.

The Cus shall provide the following functions:

- a. Two Position Control: This function shall provide control for a two state device by comparing a set point against a process variable and an established deadband.
- b. Floating Point Control: This function shall exercise control when an error signal exceeds an established deadband, and maintains control until the signal is within the deadband limits.
- c. Signal Selection: Which allows the selection of the highest or lowest of a group of analog signals so as to reduce these to a single value
- d. Signal Averaging: which allows the averaging of multiple analog signals into a single value. Permitting optional weighting of input signal to bias control output.
- e. Reset Function: which allows an analog output to be set based on any combination of input data including reset schedules.
- f. PID Control - with direct digital control implemented by using a proportional, integral, differential function to compute the control point value from the set point and measured values.

#### 2.15.9 Not Used

#### 2.15.10 CU Resident Application Software

With the exception of scheduled start/stop, setback, duty-cycling, and optimum start/stop, all CU resident applications shall be implemented as algorithms written by Williams Electric Company, Inc. Control Language. This allows a degree of customization which is not attainable by using pre-written software. The algorithm language shall be sufficiently flexible that virtually any sequence of operation can be implemented no matter how complex. CUs shall contain all information required to execute the applications within their memory and operate equally well whether operating stand-alone or online with the COS.

Most WEC applications are divided into two parts. The first part is determination of the set point. This can use any of a number of different strategies depending on the desired results. Typically this ranges anywhere from a manually set constant to a set point determined by outside air temperature. The second part of the application is to attain and maintain the desired set point. This is most often done by using a PID controlled Direct Digital Control Loop. However it can also be implemented using a number of

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other functions including two point control or control of an external set point controller.

#### 2.15.10.1 Not Used

#### 2.15.10.2 Not Used

#### 2.15.10.3 Scheduled Start/Stop Program

This program shall start and stop equipment based on a time of day schedule for each day of the week, and on a holiday schedule. To eliminate power surges, an operator adjustable time delay shall be provided between consecutive start commands.

#### a. Program Inputs:

- (1) Day of week/holiday.
- (2) Time of day.
- (3) Cooling and heating high-low alarm limits.
- (4) Cooling and heating start-stop schedules.
- (5) Cooling or heating mode of operation.
- (6) Equipment status.
- (7) Equipment constraints.
- (8) Consecutive start time delay.

#### b. Program Outputs: Start/stop signal.

#### 2.15.10.4 Optimum Start/Stop Program

This program shall start and stop equipment as specified for the scheduled start/stop program, but shall include a sliding schedule based on indoor and outdoor air conditions. The program shall take into account the thermal characteristics of the structure, and indoor and outdoor air conditions, using prediction software to determine the minimum time of HVAC system operation needed to satisfy space environmental requirements at the start of the occupied cycle, and determine the earliest time for stopping equipment at the day's end without exceeding space environmental requirements. An adaptive control algorithm shall be utilized to automatically adjust the constants used in the program.

a. Program Inputs:

- (1) Day of week/holiday.
  - (2) Time of day.
  - (3) Cooling or heating mode of operation.
  - (4) Equipment status.
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- (5) Cooling and heating building occupancy schedules.
  - (6) Space temperature.
  - (7) Building heating constant (operator adjustable and automatically optimized).
  - (8) Building cooling constant (operator adjustable and automatically optimized).
  - (9) OA temperature.
  - (10) Required space temperature at occupancy (heating).
  - (11) Required space temperature at occupancy (cooling).
  - (12) Equipment constraints.
  - (13) Cooling and heating high-low alarm limits.

b. Program Outputs: Start/stop signal.

2.15.10.5 Day-Night Setback Program

The software shall limit the rise or drop of space temperature (or specified fluid temperature) during unoccupied hours. Whenever the space temperature (or specified fluid temperature) is above (or below for heating) the operator assigned temperature limit, the system shall be turned on until the temperature is within the assigned temperature limit.

a. Program Inputs:

- (1) Day of week.
- (2) Time of day.
- (3) Cooling or heating mode of operation.
- (4) Cooling and heating occupancy schedules.
- (5) Equipment status.
- (6) Space temperature (or specified fluid temperature).
- (7) Minimum space temperature (or specified fluid temperature) during unoccupied periods.
- (8) Maximum space temperature (or specified fluid temperature) during unoccupied periods.
- (9) Equipment constraints.

b. Program Outputs: Start/stop signal.

2.15.10.6 Not Used

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2.15.10.7 Not Used

2.15.10.8 Not Used

2.15.10.9 Reheat Coil Reset Program

The software shall select the zone with the least amount of heat required. The program shall reset the cold deck discharge temperature upward until it satisfies the zone with the lowest demand, or until the zone humidity

control requirements cannot be met.

a. Program Inputs:

- (1) Zone RH high limit.
- (2) Zone temperature (where shown).
- (3) Zone RH (where shown).
- (4) Cold deck temperature.
- (5) Reheat coil valve positions or proportional signals from primary elements.
- (6) Minimum space temperature during occupied periods.
- (7) Maximum space temperature during occupied periods.
- (8) Equipment constraints.

b. Program Output: Cold deck valve actuator control signal.

2.15.10.10 Heating and Ventilating Unit Program

The software shall control hot water coil valve position to maintain space/supply air temperatures for heating and ventilating units. This program shall be coordinated with the ventilation-recirculation program for damper control and the scheduled or optimum start-stop program for fan control.

a. Program Inputs

- (1) Space temperature.
- (2) Space temperature setpoint.
- (3) Supply air temperature.
- (4) Supply air temperature setpoint.

b. Program Outputs

- (1) Heating coil valve actuator control signal.
- (2) Damper actuator control signal.

2.15.10.11 Not Used

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2.15.10.12 Not Used

2.15.10.13 Not Used

2.15.10.14 Not Used

2.15.10.15 Not Used

2.15.10.16 Not Used

2.15.10.17 Not Used

2.15.10.18 Not Used

2.15.10.19 Not Used

2.15.10.20 Not Used

2.15.10.21 Not Used

2.15.10.22 Not Used

2.15.10.23 Not Used

PART 3 EXECUTION

3.1 GENERAL INSTALLATION CRITERIA

3.1.1 HVAC Control System

The HVAC control system shall be completely installed and ready for operation. Dielectric isolation shall be provided where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exterior shall be made watertight. The HVAC control system installation shall provide clearance for control system maintenance by maintaining access space between coils, access space to mixed-air plenums, and other access space required to calibrate, remove, repair, or replace control system devices. The control system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

3.1.2 Software Installation

Software shall be loaded for an operational system, including databases for

all points, operational parameters, and system, command, and application software. The Contractor shall provide original and backup copies of source, excluding the general purpose operating systems and utility programs furnished by computer manufacturers and the non-job-specific proprietary code furnished by the system manufacturer, and object modules for software on each type of media utilized, within 30 days of formal Government acceptance. In addition, a copy of individual floppy disks of software for each DDC panel shall be provided.

#### 3.1.3 Device Mounting Criteria

Devices mounted in or on piping or ductwork, on building surfaces, in mechanical/electrical spaces, or in occupied space ceilings shall be

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installed in accordance with manufacturer's recommendations and as shown. Control devices to be installed in piping and ductwork shall be provided with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Strap-on temperature sensing elements shall not be used except as specified.

#### 3.1.4 Wiring Criteria

Wiring external to control panels, including low-voltage wiring, shall be installed in metallic raceways. Nonmetallic-sheathed cables or metallic armored

cables may be installed in areas permitted by NFPA 70. Wiring shall be installed without splices between control devices and DDC panels.

Instrumentation grounding shall be installed as necessary to prevent ground loops, noise, and surges from adversely affecting operation of the system. Ground rods installed by the contractor shall be tested as specified in IEEE Std 142. Cables and conductor wires shall be tagged at both ends, with the identifier shown on the shop drawings. Electrical work shall be as specified in Section 16415 ELECTRICAL WORK, INTERIOR and as shown.

### 3.2 CONTROL SYSTEM INSTALLATION

#### 3.2.1 Damper Actuators

Actuators shall not be mounted in the air stream. Multiple actuators operating a common damper shall be connected to a common drive shaft. Actuators shall be installed so that their action shall seal the damper to the extent required to maintain leakage at or below the specified rate and shall move the blades smoothly.

#### 3.2.2 Not Used

#### 3.2.3 Room Instrument Mounting

Room instruments, such as wall mounted thermostats, shall be mounted 60 inches above the floor unless otherwise shown. Temperature setpoint devices shall be recess mounted.

#### 3.2.4 Freezestats

For each 20 square feet of coil face area, or fraction thereof, a freezestat shall be provided to sense the temperature at the location shown. Manual reset freezestats shall be installed in approved, accessible locations where they can be reset easily. Setpoints shall be field adjustable. The freezestat sensing element shall be installed in a serpentine pattern.

#### 3.2.5 Averaging Temperature Sensing Elements

Sensing elements shall have a total element minimum length equal to 1 linear foot per square foot of duct cross-sectional area.

#### 3.2.6 Not Used

#### 3.2.7 Not Used

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### 3.2.8 Duct Static Pressure Sensing Elements and Transmitters

The duct static pressure sensing element and transmitter sensing point shall be located at 75% to 100% of the distance between the first and last air terminal units.

### 3.2.9 Not Used

### 3.2.10 Not Used

## 3.3 CONTROL SEQUENCES OF OPERATION

### 3.3.1 General Requirements - HVAC Systems

These requirements shall apply to all primary HVAC systems unless modified herein. The sequences describe the actions of the control system for one direction of change in the HVAC process analog variable, such as temperature, humidity or pressure. The reverse sequence shall occur when the direction of change is reversed. Sequences of Operation shall be as indicated on contract drawings.

## 3.4 COMMISSIONING PROCEDURES

### 3.4.1 Evaluations

The Contractor shall make the observations, adjustments, calibrations, measurements, and tests of the control systems, set the time schedule, and make any necessary control system corrections to ensure that the systems function as described in the sequence of operation.

#### 3.4.1.1 Item Check

Signal levels shall be recorded for the extreme positions of each controlled device. An item-by-item check of the sequence of operation requirements shall be performed using Steps 1 through 4 in the specified control system commissioning procedures. Steps 1, 2, and 3 shall be performed with the HVAC system shut down; Step 4 shall be performed after the HVAC systems have been started. External input signals to the DDC system (such as starter auxiliary contacts, and external systems) may be simulated in steps 1, 2, and 3. With each operational mode signal change, DDC system output relay contacts shall be observed to ensure that they function.

#### 3.4.1.2 Weather Dependent Test Procedures

Weather dependent test procedures that cannot be performed by simulation shall be performed in the appropriate climatic season. When simulation is used, the actual results shall be verified in the appropriate season.

#### 3.4.1.3 Two-Point Accuracy Check

A two-point accuracy check of the calibration of each HVAC control system sensing element and transmitter shall be performed by comparing the DDC system readout to the actual value of the variable measured at the sensing element and transmitter or airflow measurement station location. Digital indicating test instruments shall be used, such as digital thermometers, motor-driven psychrometers, and tachometers. The test instruments shall be at least twice as accurate as the specified sensing element-to-DDC system

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readout accuracy. The calibration of the test instruments shall be traceable to National Institute Of Standards And Technology standards. The first check point shall be with the HVAC system in the shutdown condition, and the second check point shall be with the HVAC system in an operational condition. Calibration checks shall verify that the sensing element-to-DDC system readout accuracies at two points are within the specified product accuracy tolerances. If not, the device shall be recalibrated or replaced and the calibration check repeated.

#### 3.4.1.4 Insertion and Immersion Temperatures

Insertion temperature and immersion temperature sensing elements and transmitter-to-DDC system readout calibration accuracy shall be checked at one physical location along the axis of the sensing element.

#### 3.4.1.5 Averaging Temperature

Averaging temperature sensing element and transmitter-to-DDC system readout calibration accuracy shall be checked every 2 feet along the axis of the sensing element in the proximity of the sensing element, for a maximum of 10 readings. These readings shall then be averaged.

#### 3.4.2 Space Temperature Controlled Perimeter Radiation

The heating medium shall be turned on, and the thermostat temperature setpoint shall be raised. The valve shall open. The thermostat temperature shall be lowered and the valve shall close. The thermostat shall be set at the setpoint shown.

#### 3.4.3 Unit Heater and Cabinet Unit Heater

The "OFF/AUTO" switch shall be placed in the "OFF" position. Each space thermostat temperature setting shall be turned up so that it makes contact to turn on the unit heater fans. The unit heater fans shall not start. The "OFF/AUTO" switch shall be placed in the "AUTO" position. It shall be ensured that the unit heater fans start. Each space thermostat temperature setting shall be turned down, and the unit heater fans shall stop. The thermostats shall be set at their temperature setpoints. The results of testing of one of each type of unit shall be logged.

#### 3.4.4 Not Used

#### 3.4.5 Not Used

#### 3.4.6 NOT USED

#### 3.4.7 Heating with Steam/Hot Water Converter

Installation shall be as follows:

a. Step 1 - System Inspection: The HVAC system shall be observed in its shutdown condition. Power and main air shall be available where required. The converter valve shall be closed.

b. Step 2 - Calibration Accuracy Check with HVAC System Shutdown:

Readings shall be taken with a digital thermometer at each temperature

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sensing element location. Each temperature shall be read at the DDC controller, and the thermometer and DDC system readings logged. The calibration accuracy of the sensing element-to-DDC system readout for outside air temperature and hydronic system supply temperature shall be checked.

c. Step 3 - Actuator Range Adjustments: A signal shall be applied to the actuator, through an operator entered value to the DDC system. The proper operation of the actuators and positions for all valves shall be verified. The signal shall be varied from live zero to full range, and it shall be verified that the actuators travel from zero stroke to full stroke within the signal range. It shall be verified that all sequenced actuators move from zero stroke to full stroke in the proper direction and move the connected device in the proper direction from one extreme position to the other.

d. Step 4 - Control System Commissioning:

(1) The two-point calibration sensing element-to-DDC system readout accuracy check for the outside air temperature shall be performed. Any necessary software adjustments to setpoints or parameters shall be made to achieve the outside air temperature schedule.

(2) A signal shall be applied to simulate that the outside air temperature is above the setpoint. It shall be verified that hot water pump stops. A signal shall be applied to simulate that the outside air temperature is below the setpoint. It shall be verified that hot water pump starts.

(3) The two-point calibration accuracy check of the sensing element-to-DDC system readout for the system supply temperature shall be performed. The system supply temperature setpoint shall be set for the temperature schedule as shown. Signals of 8 ma and 16 ma shall be sent to the DDC system from the outside air temperature sensor, to verify that the supply temperature setpoint changes to the appropriate values.

(4) The control system shall be placed in the occupied mode. The calibration accuracy check of sensing element-to-DDC system readout shall be performed for each space temperature sensor and the values logged. Each space temperature setpoint shall be set as shown. The control system shall be placed in the unoccupied mode, and it shall be verified that each space temperature setpoint changes to the unoccupied mode setting.

3.4.8 Not Used

3.4.9 Not Used

3.4.10 Not Used

3.4.11 Not Used

3.4.12 Not Used

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3.4.13 Not Used

3.4.14 Not Used

3.4.15 Not Used

3.4.16 Not Used

3.4.17 Not Used

3.4.18 Not Used

3.4.19 Single Zone with Hydronic Heating and Cooling Coils; No Return Fan  
Steps for installation shall be as follows:

a. Step 1 - System Inspection: The HVAC system shall be verified in its shutdown condition. The system shall be checked to see that power and main air are available where required, that the outside air damper, relief air damper, and cooling coil valve are closed, and that the return air damper is open.

b. Step 2 - Calibration Accuracy Check with HVAC System Shutdown: Readings shall be taken with a digital thermometer at each temperature sensing element location. Each temperature shall be read at the DDC controller, and the thermometer and DDC system display readings logged. The calibration accuracy of the sensing element-to-DDC system readout for outside air, return air, and space temperatures shall be checked.

c. Step 3 - Actuator Range Adjustments: A signal shall be applied to the actuator through an operator entered value to the DDC system. The proper operation of the actuators and positioners for all dampers and valves shall be visually verified. The signal shall be varied from live zero to full range, and the actuator travel from zero stroke to full stroke within the signal range shall be verified. It shall be verified that all sequenced and parallel-operated actuators move from zero stroke to full stroke in the proper direction, and move the connected device in the proper direction from one extreme position to the other.

d. Step 4 - Control System Commissioning:

(1) With the fan ready to start, the control system shall be placed in the ventilation delay mode and in the occupied mode, and it shall be verified that supply fan starts. It shall be verified that the outside air and relief air dampers are closed, the return air damper is open, and the heating coil and cooling coil valves are under control, by simulating a change in the space temperature

through an operator entered value. The control system shall be placed out of the ventilation delay mode, and it shall be verified that the outside air, return air, and relief air dampers come under control by simulating a change in the space temperature.

(2) The control system shall be placed in the minimum outside air mode. It shall be verified that the outside air damper opens to minimum position.

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(3) The economizer mode shall be simulated by a change in the outside air temperature and the return air temperature through operator entered values and it shall be verified that the system goes into the economizer mode. The space temperature shall be artificially changed through operator entered values to slightly open the outside air damper and the second point of the two-point calibration accuracy check of sensing element-to-DDC system readout for outside air, return air, and space temperatures shall be performed. The space temperature setpoint shall be set as shown.

(4) An unoccupied mode signal shall be applied, and it shall be verified that the HVAC system shuts down, and the control system assumes the specified shutdown conditions. The space temperature shall be artificially changed to below the night setback temperature setpoint, and it shall be verified that the HVAC system starts; the space temperature shall be set to above the night setback setpoint, and it shall be verified that the HVAC system stops. The night setback temperature setpoint shall be set at the setpoint as shown.

(5) With the HVAC system running, a filter differential pressure switch input signal shall be simulated at the device. It shall be verified that the filter alarm is initiated. The differential pressure switch shall be set at the setpoint.

(6) With the HVAC system running, a freezestat trip input signal shall be simulated at the device. HVAC system shutdown shall be verified. It shall be verified that a low temperature alarm is initiated. The freezestat shall be set at the setpoint. The HVAC system shall be restarted by manual restart and it shall be verified that the alarm returns to normal.

(7) With the HVAC system running, a smoke detector trip input signal at each detector shall be simulated, and control device actions and interlock functions as described in the Sequence of Operation shall be verified. Simulation shall be performed without false-alarms any Life Safety systems. It shall be verified that the HVAC system shuts down and that the smoke detector alarm is initiated. The detectors shall be reset. The HVAC system shall be restarted by manual reset, and it shall be verified that the alarm returns to normal.

3.4.20 Not Used

3.4.21 Not Used

3.4.22 Single Zone with Hydronic Heating Direct Expansion Cooling With Return Fan

Steps for installation shall be as follows:

a. Step 1 - System Inspection: The HVAC system shall be verified in its shutdown condition. The system shall be checked to see that power and main air are available where required, the outside air damper and relief air damper are closed, all stages of cooling are off, and that the return air damper is open.

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b. Step 2 - Calibration Accuracy Check with HVAC System Shutdown:

Readings shall be taken with a digital thermometer at each temperature sensing element location. Each temperature shall be read at the DDC controller, and the thermometer and DDC system display readings logged. The calibration accuracy of the sensing element-to-DDC system readout for outside air, return air, and space temperatures shall be checked.

c. Step 3 - Actuator Range Adjustments: A signal shall be applied to the actuator, through an operator entered value to the DDC system. The proper operation of the actuators and positioners for all dampers and valves shall be visually verified. The signal shall be varied from live zero of 4 ma to 20 ma, and it shall be verified that the actuators travel from zero stroke to full stroke within the signal range. It shall be verified that all sequenced and parallel operated actuators move from zero stroke to full stroke in the proper direction and move the connected device in the proper direction from one extreme position to the other. Example: NC actuators are closed at 4 ma and are open at 20 ma. The signal levels that move the controlled device to its extreme positions shall be logged. The operating points of the sequence shall be set for each stage of cooling and the proper operation of each stage shall be verified.

d. Step 4 - Control System Commissioning:

(1) With the fan ready to start, the control system shall be placed in the ventilation delay mode and in the occupied mode, and it shall be verified that supply fan and return fan start. It shall be verified that the outside air and relief air dampers are closed, the return air damper is open, and the heating coil and stages of cooling are under control, by simulating a change in the space temperature. The control system shall be placed out of the ventilation delay mode, and it shall be verified that the outside air, return air, and relief air dampers come under control by simulating a change in the mixed air temperature.

(2) The control system shall be placed in the minimum outside air mode. It shall be verified that the outside air damper opens to minimum position.

(3) A change in space temperature shall be simulated and it shall be verified that the heating coil valve and the stages of D/X cooling operate in sequence as shown.

(4) The control system shall be placed in the unoccupied mode, and it shall be verified that the HVAC system shuts down, and the control system assumes the specified shutdown conditions. The space temperature shall be artificially changed to below the night setback temperature setpoint, and it shall be verified that the HVAC system starts; the space temperature shall be artificially changed to above the night setback temperature setpoint, and it shall be verified that the HVAC system stops. The night setback temperature setpoint shall be set at the setpoint as shown.

(5) With the HVAC system running, a filter differential pressure switch input signal shall be simulated at the device. It shall be verified that the filter alarm is initiated. The differential pressure switch shall be set at the setpoint as shown.

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(6) With the HVAC system running, a freezestat trip input signal shall be simulated at the device. HVAC system shutdown shall be verified. It shall be verified that a low-temperature alarm is initiated. The freezestat shall be set at the setpoint. The HVAC

system shall be restarted by manual restart and it shall be verified that the alarm returns to normal.

(7) With the HVAC system running, a smoke detector trip input signal shall be simulated at each detector, and control device actions and interlock functions as described in the Sequence of Operation shall be verified. Simulation shall be performed without false-alarming any Life Safety systems. It shall be verified that the HVAC system shuts down and that the smoke detector alarm is initiated. The detectors shall be reset. The HVAC system shall be restarted by manual reset, and it shall be verified that the alarm returns to normal.

(8) A recirculating hot water heating coil pump input signal shall be simulated and verified running at the device, but a change in outside air temperature of 45°F (adjustable) and below, through operator entered value.

(9) For unit served by hot water boilers system the control system shall be indexed to the heating mode and it shall be verified that the cooling compressor shutdown and the control for hot water boiler heating system and control valves are enabled.

(a) The two-point calibration accuracy check of the sensing element-to-DDC system readout for the hydronic system supply temperature shall be performed. The supply temperature setpoint shall be set for the temperature schedule as shown. Signals of 8 ma and 16 ma shall be sent to the DDC system from the outside air temperature sensor, to verify that the supply temperature setpoint changes to the appropriate values.

(b) The two-point accuracy check of sensing element-to-DDC system readout for the hydronic system return temperature shall be performed. It shall be verified that the return water temperature setpoint is set to the setpoint. The control system shall be placed in the unoccupied mode.

(c) The control system shall be indexed to the cooling mode. It shall be verified that the boilers shutdown, the cooling compressor energized and the cooling starts.

(10) For unit with economizer the economizer mode shall be simulated by a change in the outside air temperature and the return air temperature through operator entered values and it shall be verified that the system goes into the economizer mode. The mixed air temperature shall be artificially changed through operator entered values to slightly open the outside air damper and the second point of the two-point calibration accuracy check of sensing element-to-DDC system readout for outside air, return air, and mixed air temperatures shall be performed. The temperature setpoint shall be set as shown.

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(11) The two-point calibration sensing element-to-DDC system readout accuracy check for the outside air temperature shall be performed. Any necessary software adjustments shall be made to setpoints or parameters to achieve the outside air temperature schedule.

### 3.5 BALANCING, COMMISSIONING, AND TESTING

#### 3.5.1 Coordination with HVAC System Balancing

Commissioning of the control system, except for tuning of controllers, shall be performed prior to or simultaneous with HVAC system balancing. The

contractor shall tune the HVAC control system after all air system and hydronic system balancing has been completed, minimum damper positions set and a report has been issued.

#### 3.5.2 Control System Calibration, Adjustments, and Commissioning

Control system commissioning shall be performed for each HVAC system, using test plans and procedures previously approved by the Government. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform commissioning and testing of the HVAC control system. All instrumentation and controls shall be calibrated and the specified accuracy shall be verified using test equipment with calibration traceable to NIST standards. Wiring shall be tested for continuity and for ground, open, and short circuits. Tubing systems shall be tested for leaks. Mechanical control devices shall be adjusted to operate as specified. HVAC control panels shall be pretested off-site as a functioning assembly ready for field connections, calibration, adjustment, and commissioning of the operational HVAC control system. Control parameters and logic (virtual) points including control loop setpoints, gain constants, and integral constraints, shall be adjusted before the system is placed on line. Communications requirements shall be as indicated. Written notification of any planned commissioning or testing of the HVAC Control systems shall be given to the Government at least 14 calendar days in advance.

#### 3.5.3 Performance Verification Test

The Contractor shall demonstrate compliance of the HVAC control system with the contract documents. Using test plans and procedures previously approved by the Government, the Contractor shall demonstrate all physical and functional requirements of the project. The performance verification test shall show, step-by-step, the actions and results demonstrating that the control systems perform in accordance with the sequences of operation. The performance verification test shall not be started until after receipt by the Contractor of written permission by the Government, based on Government approval of the Commissioning Report and completion of balancing. The tests shall not be conducted during scheduled seasonal off periods of base heating and cooling systems.

#### 3.5.4 Endurance Test

The endurance test shall be used to demonstrate the specified overall system reliability requirement of the completed system. The endurance test shall not be started until the Government notifies the Contractor in writing that the performance verification test is satisfactorily completed. The

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Government may terminate the testing at any time when the system fails to perform as specified. Upon termination of testing by the Government or by the Contractor, the Contractor shall commence an assessment period as described for Phase II. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation as specified to the Government prior to acceptance of the system.

a. Phase I (Testing). The test shall be conducted 24 hours per day, 7 days per week, for 15 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized by the Government in writing.

b. Phase II (Assessment). After the conclusion of Phase I, the Contractor shall identify failures, determine causes of failures, repair failures, and deliver a written report to the Government. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed. After delivering the written report, the Contractor

shall convene a test review meeting at the jobsite to present the results and recommendations to the Government. As a part of this test review meeting, the Contractor shall demonstrate that all failures have been corrected by performing appropriate portions of the performance verification test. Based on the Contractor's report and test review meeting, the Government may require that the Phase I test be totally or partially rerun. After the conclusion of any retesting which the Government may require, the Phase II assessment shall be repeated as if Phase I had just been completed.

#### 3.5.5 Posted and Panel Instructions

Posted and Panel Instructions, showing the final installed conditions, shall be provided for each system. The posted instructions shall consist of laminated half-size drawings and shall include the control system schematic, equipment schedule, sequence of operation, wiring diagram, communication network diagram, and valve and damper schedules. The posted instructions shall be permanently affixed, by mechanical means, to a wall near the control panel. Panel instructions shall consist of laminated letter-size sheets and shall include a Routine Maintenance Checklist and as-built configuration check sheets. Panel instructions and one copy of the Operation and Maintenance Manuals, previously described herein, shall be placed inside each control panel or permanently affixed, by mechanical means, to a wall near the panel.

### 3.6 TRAINING

#### 3.6.1 Training Course Requirements

A training course shall be conducted for operating staff members designated by the Contracting Officer in the maintenance and operation of the system, including specified hardware and software. The training period, for a total of 32 hours of normal working time, shall be conducted within 30 days after successful completion of the performance verification test. The training course shall be conducted at the project site. Audiovisual equipment and 8 sets of all other training materials and supplies shall be provided. A training day is defined as 8 hours of classroom instruction, including two 15 minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility.

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#### 3.6.2 Training Course Content

For guidance in planning the required instruction, the Contractor shall assume that attendees will have a high school education or equivalent, and are familiar with HVAC systems. The training course shall cover all of the material contained in the Operating and Maintenance Instructions, the layout and location of each HVAC control panel, the layout of one of each type of unitary equipment and the locations of each, the location of each control device external to the panels, the location of the compressed air station, preventive maintenance, troubleshooting, diagnostics, calibration, adjustment, commissioning, tuning, and repair procedures. Typical systems and similar systems may be treated as a group, with instruction on the physical layout of one such system. The results of the performance verification test and the calibration, adjustment and commissioning report shall be presented as benchmarks of HVAC control system performance by which to measure operation and maintenance effectiveness.



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